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NASJRB WILLOW GROVE
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SAMPLING AND ANALYSIS PLAN 2013 FOLLOW-UP CERFA ACTIVITIES NAS WILLOW GROVE PA

12/23/2013

RESOLUTION CONSULTANTS

SAMPLING AND ANALYSIS PLAN
2013 FOLLOW-UP CERFA ACTIVITIES
NAS JRB
WILLOW GROVE, PA

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Mid-Atlantic
9742 Maryland Ave.
Norfolk, VA 23511-3095

Contract Number N62470-11-D-8013

CTO WE28

Prepared by:

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, VA 23510

December 23, 2013

SAP Worksheet #1: Title and Approval Page

SAMPLING AND ANALYSIS PLAN
2013 FOLLOW-UP CERFA ACTIVITES

December 23, 2013

Naval Air Station Joint Reserve Base
Willow Grove, PA

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Review Signature: Michael T. Shannon 1/16/14

Mike Shannon, CTO Manager — Date
Resolution Consultants

Approval Signature: _____

Judy Solomon/Chemist, QA Manager — Date
US Navy

Other Approval Signature: HELLAND.BRIAN.J.1231396710

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Brian Helland, Navy RPM — Date
US Navy

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Date: 2014.01.15 12:30:44 -05'00'

Judy Solomon/Chemist, QA Manager — Date
US Navy

Other Approval Signature:

Brian Helland, Navy RPM — Date
US Navy

EXECUTIVE SUMMARY

This Tier II Sampling and Analysis Plan (SAP) was prepared by Resolution Consultants (Resolution) for the U.S. Department of the Navy (Navy) and the Naval Facilities Engineering Command (NAVFAC). Resolution has conducted this work under NAVFAC Atlantic, Comprehensive Long-Term Environmental Action, Navy (CLEAN) Contract No. N62470-11-D-8013, Contract Task Order (CTO) WE28. This SAP pertains to planned field investigations at multiple sites at Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove, Pennsylvania to support transfer considerations.

In 2005, the NAS JRB Willow Grove, Pennsylvania was designated for closure under the authority of the Defense Base Realignment and Closure Act (BRAC) of 1990, Public Law 101-510 as amended. In April 2007, the Navy prepared a Community Environmental Response Facilitation Act (CERFA) report, which provided the results of the Navy's identification of uncontaminated property. Several data gaps and follow-up CERFA actions have since been identified. Consistent with the February 14, 2013 Statement of Work (SOW) and discussions with the Navy Remedial Program Manager (RPM), the primary objective of this SAP is to address the CERFA data gaps so that uncontaminated property can be identified or impacts can be addressed prior to transfer. To meet these objectives the following goals are addressed in this SAP:

- Determine whether lead exceeds Pennsylvania Statewide Health Standards (SWHS) or the USEPA Site Screening Level (SSL) for residential soil at the locations of Buildings 63, 109, 110, 111, 112, 113 and 114. Verify that the effectiveness of planned "hot-spot" removal actions to address lead contamination of soil, if present.

- Verify that the effectiveness of "hot-spot" removal actions of soil impacted by polycyclic aromatic hydrocarbons and Building 15A and lead at the Former Water Tower adjacent to Building 107/108.

- Determine whether PCB spills have occurred from transformers in Buildings 15B, 70, and 610.

- Determine whether lead-based paint is present at Building 139.

- Determine whether concentrations of Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), or metals exceed the Pennsylvania SWHSs or the EPA RSLs in subsurface soil adjacent to the oil water separator and wash rack system near Building 178.

- Determine whether concentrations of VOCs, SVOCs, or metals exceed the SWHSs or the EPA RSLs in surface soil adjacent to a concrete pad at land designated as "CERFA 2013:

Additional Parcel South - South of Maple Avenue" or in the areas were potential soil disturbance was visible on historical aerial photos of the land designated as "Outside Land South – South of Maple Avenue" in the Southern Approach Zone.

Table ES-1 summarizes the matrices and analytical parameters planned for each site.

Table ES-1
Analytical Parameters Designed to Achieve Investigation Goals
NAS JRB, Willow Grove, Pennsylvania

Building/Area	Parameter	Matrix
63, 107/108. 109, 110, 111, 112, 113 and 114	Lead	Soil
15A	PAHs	Soil
15B, 70, and 610	PCBs	Concrete
139	Lead	Paint
OWS/Wash Rack at 178, "CERFA 2013: Additional Parcel South - South of Maple Avenue", and "Outside Land South – South of Maple Avenue"	VOCs, SVOCs, and metals	Soil

CONTENTS

Figures

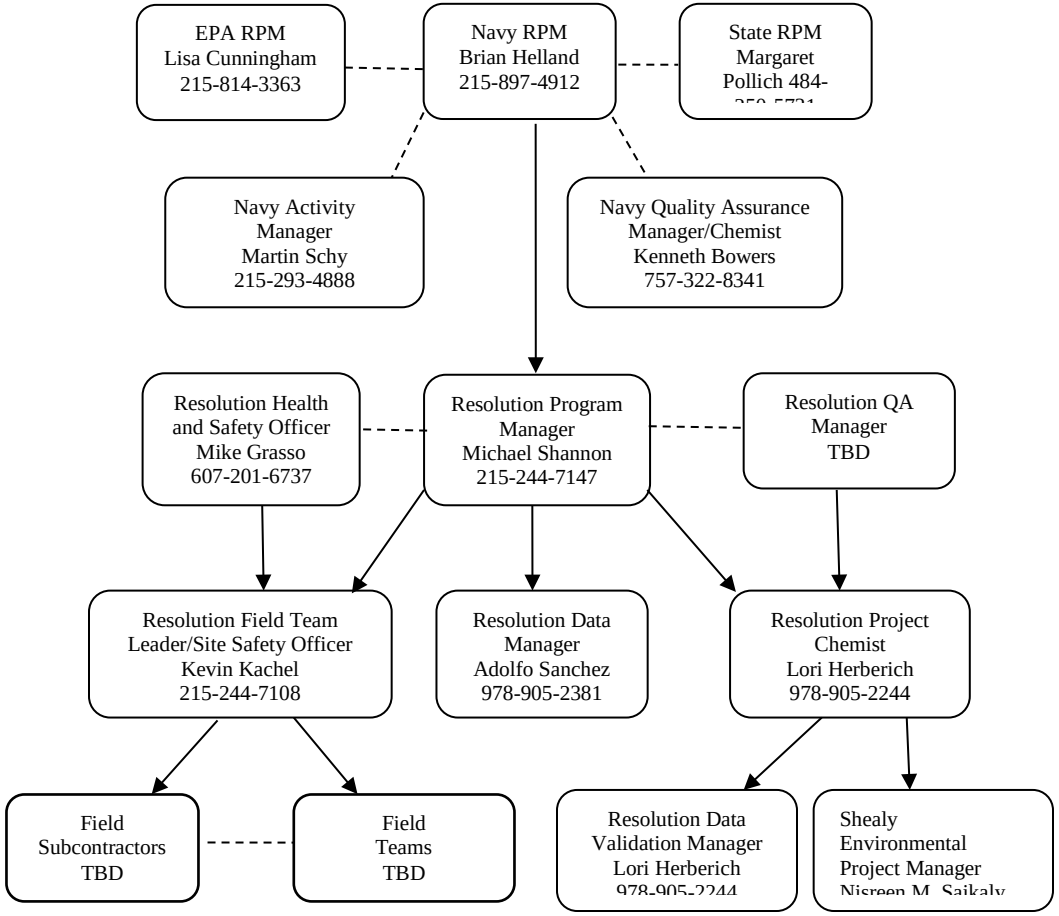
ACRONYMS AND ABBREVIATIONS

°C	Celsius
bgs	Below ground surface
CERFA	Community Environmental Response Facilitation Act
cm	Centimeters
CSM	Conceptual Site Model
CTO	Contract task order
DD	Day
DL	Detection limits
DoD	Department of Defense
DoD QSM	Department of Defense Quality Systems Manual
DPT	Direct-push technology
DQO	Data quality objective
DVM	Data Validation Manager
|Diff|	Absolute Difference
FTL	Field Task Leader
FTMR	Field Task Modification Request
GIS	Geographic Information System
GPS	Global positioning system
HASP	Health and Safety Plan
HSO	Health and Safety Officer
ICAL	Initial calibration
ID	Identifications
IDW	investigative derived waste
IS	Internal standard
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
LOD	Limit of detection
LOQ	Limits of quantitation
MSC	Medium Specific Concentration
mg/kg	Milligrams per kilogram (parts per million)
MM	Month
MS/MSD	Matrix spike/matrix spike duplicate
NA	Not applicable
NAVFAC MIDLANT	Naval Facilities Engineering Command Mid-Atlantic
oz.	Ounces

OWS	Oil water separator
PAH	Polynuclear aromatic hydrocarbon
PAL	Project action limit
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PID	Photoionization detector
PCBs	Polychlorinated biphynels
PM	Project manager
POC	Point of contact
QA	Quality assurance
QA/QC	Quality assurance/quality control
QAO	Quality Assurance Officer
QAPP	Quality assurance project plan
QC	Quality control
QSM	Quality systems manual
R	Data validation qualifier (rejected)
RPD	Relative percent difference
RPM	Remedial project manager
RRT	Relative retention time
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SIM	Selective ion monitoring
SVOC	Semi-volatile Organic Compound
SSL	Site Screening Level
SOP	Standard operating procedure
SWHS	Statewide Health Standards
SSO	Site Safety Officer
TBD	To be determined
UFP	Uniform Federal Policy
UFP-QAPP	Uniform Federal Policy for Quality Assurance Plans
UJ	Data validation qualifier (estimated, non-detect)
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compounds
YYYY	Year

SAP Worksheet #5: Project Organizational Chart

Lines of Authority ——————— Lines of Communication - - - - - - - - - - - - - -



SAP Worksheet #6: Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

The communication pathways for the SAP are shown below.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Regulatory Agency Interface	Navy RPM	Brian Helland	215-897-4912	Navy RPM will interface with Regulatory Agency directly via phone or email as needed.
Field Progress Reports	Resolution FTL\SSO Resolution PM Navy RPM	Kevin Kachel Michael Shannon Brian Helland	215-244-7108 215-244-7147 215-897-4912	The Resolution FTL will email daily field progress reports to the Resolution PM. In addition, there will be phone conversation between the Resolution FTL and the Resolution PM as needed. The Resolution RPM will email the Navy RPM at a minimum weekly or as needed.
Stop Work due to Safety Issues	Resolution FTL/SSO Resolution PM Resolution HSO Navy RPM	Kevin Kachel Michael Shannon Michael Grasso Brian Helland	215-244-7108 215-244-7147 607-201-6737 215-897-4912	The Resolution SSO will verbally inform onsite personnel, including subcontractors as soon as possible. The Resolution SSO will verbally inform the Resolution PM of the Stop Work condition as well as when it is resolved. As need be, the Resolution SSO and/or PM will work with the Resolution HSO and Navy RPM to resolve issues.
SAP/WP Changes prior to Field/ Laboratory work	Resolution PM Navy RPM	Michael Shannon Brian Helland	215-244-7147 215-897-4912	The Resolution PM will notify the Navy RPM either verbally or via email of any planned amendments to the SAP. The Resolution PM will document the changes via a FTMR form and a concurrence letter.
SAP/WP Changes in the Field	Navy RPM Resolution PM Resolution FTL/SSO	Brian Helland Michael Shannon Kevin Kachel	215-897-4912 215-244-7147 215-244-7108	The Resolution FTL will verbally notify the Resolution PM as soon as practical of realizing a need for an amendment. The Resolution PM will notify the Navy RPM either verbally or via email the same day of the realized change and the changes will be documented in a scheduled impact letter to the Navy RPM.
Field Corrective Actions	Resolution FTL\SSO Resolution PM Navy RPM	Kevin Kachel Michael Shannon Brian Helland	215-244-7108 215-244-7147 215-897-4912	The need for corrective action for field issues will be determined by the Resolution FTL. The Resolution FTL will notify the Resolution PM.

Sample Receipt and Lab Quality Variances	Laboratory Manager Resolution FTL\SSO Resolution PM Resolution Project Chemist	Lori Herberich Kevin Kachel Michael Shannon Lori Herberich	978-905-2244 215-244-7108 215-244-7147 978-905-2244	The Laboratory PM will notify (verbally or via e-mail) the Resolution FTL immediately upon receipt of any chain of custody/sample receipt variances for clarification or direction from the Resolution FTL. The Resolution FTL will notify (verbally or via e-mail) the Resolution PM and project chemist within 1 business day, if corrective action is required. The Resolution PM or project chemist will notify (verbally or via e-mail) the Laboratory PM and the Resolution FTL within 1 business day of any required corrective action.
Analytical Corrective Actions	Laboratory Manager Resolution Project Chemist	Lori Herberich	978-905-2244	The laboratory will notify the Resolution project chemist of any analytical data anomaly within 1 business day of discovery. After the laboratory receives guidance from Resolution project chemist, the laboratory shall initiate any corrective action to prevent further anomalies.
Analytical Data Quality Issues	Resolution FTL\SSO Resolution PM Resolution Project Chemist Navy RPM Laboratory Manager	Kevin Kachel Michael Shannon Lori Herberich Brian Helland Lori Herberich	215-244-7108 215-244-7147 978-905-2244 215-897-4912 978-905-2244	The laboratory PM will notify (verbally or via e-mail) the Resolution project chemist within 1 business day of when an issue related to laboratory data is discovered. The Resolution project chemist will notify the Resolution PM within 1 business day. The Resolution project chemist will notify the Resolution PM verbally or via e-mail within 48 hours of validation completion that a non-routine and significant laboratory quality deficiency has been detected that could affect this project and/or other projects. The Resolution PM will verbally advise the Navy RPM within 24 hours of notification from the chemist. The Navy RPM will engage the Navy QAO to ensure the issues with this project can be evaluated to determine impact to other DoD projects.

Reporting Data Validation Issues/ Data Validation Corrective Actions	Resolution PM Resolution Project Chemist	Michael Shannon Lori Herberich	215-244-7147 978-905-2244	The Resolution project chemist or data validator will perform validation as specified in Worksheets #34, 35, and 36, and will contact the laboratory as soon as possible if issues are found that require corrective action. If the Resolution project chemist or data validator identifies non-usable data during the data validation process that requires corrective action, the Resolution PM will coordinate with the project chemist to take corrective action appropriate for the identified deficiency to ensure the project objectives are met. Corrective action may include resampling and/or reanalyzing the affected samples, as determined by the Resolution PM.
Notification of Non-Usable Data	Resolution PM Resolution Project Chemist Navy RPM Laboratory Manager	Michael Shannon Lori Herberich Brian Helland Lori Herberich	215-244-7147 978-905-2244 215-897-4912 978-905-2244	If the laboratory determines that any data they have generated is non-usable, the Laboratory PM will notify (verbally or via e-mail) the Resolution project chemist within 1 business day of when the issue is discovered. The Resolution project chemist will notify (verbally or via e-mail) Resolution PM within 1 business day of the need for corrective action, if the non-usable data is a significant issue (i.e., critical sample data). Corrective action may include resampling and/or reanalyzing the effected samples. If a Resolution project chemist or data validator identifies non-usable data during the data validation process, the PM will be notified verbally or via e-mail within 48 hours of validation completion that a non-routine and significant laboratory quality deficiency has resulted in non-usable data. The Resolution PM will take corrective action appropriate for the identified deficiency to ensure the project objectives are met. The Resolution PM will notify (verbally or via email) the Navy RPM on any problems with the laboratory or analysis that could significantly affect the usability of the data or project failures that impact the ability to complete the scope of work. The Navy RPM will contact the Navy QAO for assistance in problem resolution. Such notification will be made within 1 business day of when the issue is discovered.

SAP Worksheet #9: Project Scoping Session Participants Sheet

(UFP-QAPP Manual Section 2.5.1)

Project Name:	JAS NRB Willow Grove CERFA Additional Investigation Activities	**Site Name:**	JAS NRB Willow Grove
Projected Date(s) of Sampling:	Summer 2013	**Site Location:**	Along Route 611 (Easton Road), Horsham, PA
Project Manager:	Michael Shannon		
Date of Session:	5/2/2013		
Scoping Session Purpose:	Site Visit		

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Brian Helland	RPM	NAVFAC MIDLANT	215-897-4912	brian.helland@navy.mil	Coordinates IR Activities
Michael Shannon	Resolution PM	Resolution	215-244-7147	michael.shannon@aecom.com	Oversight of SAP Production

Comments/Decisions:

- PCB sampling will focus on the floors in Bldgs. 610, 15B, and 70.
- Lead paint samples will be collected from Bldg. 139.
- The Test Cell Well has already been abandoned.
- Several wells could not be located: NELW-3 (Site 4), RR2W-2 (Site 7), and Captain's Quarters Well.
- Several wells on the Department of Agriculture Test Pad were found to be damaged and opened and reported to have obstructions. PA well abandonment regulations require that wells be over drilled if the cross different water bearing zones.
- The wash rack and OWS appear to be located to the NW of Bldg. 178. Eight soil borings will be collect from the grassy area. Several utilities cross through this area.
- Resolution will hold off on abandoning 02MW03S on Site 2 until a later date. It is anticipated that this well will be abandoned when the wells on Site 2 are abandoned.

- Soil sampling for potential lead contamination will be focused on a narrow swath (approximately 3 feet) directly adjacent to the buildings. The focus is the potential impact of lead paint on soil.

Action Items:

- Resolution PM will see if he can find any additional information on the construction of the Department of Agriculture Test Pad wells or depth to bedrock in this area. The Resolution PM's experience with drilling in the area is that rock is typically found at 10 to 20 feet bgs.
- Resolution will begin the procurement process for well abandonment. The Navy will notify EPA of our intention to abandon the wells.
- Resolution will use the coordinates provided by Tetra Tech to attempt to locate the following wells: NELW-3 (Site 4), RR2W-2 (Site 7), and Captain's Quarters Well during a future site visit. Resolution will also solicit help from the CSO in locating the Captain's Quarters Well.
- Resolution will obtain the complete GIS data from Tetra Tech.

Consensus Decisions:

- The memos related to the investigation activities will be submitted to EPA. Although the EPA is not expected to consider these CERCLA sites and is likely to defer to PADEP, the required detection limits should meet the SSLs including the Protection of Groundwater standards.
- The Navy will notify Resolution when they are to proceed with the assessment of lead in soil. This SOW will be addressed in the SAP which is currently being prepared. The action limit of 400 mg/kg for lead in soil is based on EPA's RAL.

Project Name:	JAS NRB Willow Grove CERFA Additional Investigation Activities	**Site Name:**	JAS NRB Willow Grove
Projected Date(s) of Sampling:	Summer 2013	**Site Location:**	Along Route 611 (Easton Road), Horsham, PA
Project Manager:	Michael Shannon		
Date of Session:	1/31/2013		
Scoping Session Purpose:	Site Visit		

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Brian Helland	RPM	NAVFAC MIDLANT	215-897-4912	brian.helland@navy.mil	Coordinates IR Activities
Willie Lin	BRAC PMO	NAVFAC MIDLANT	215-897-4904	willie.lin@navy.mil	Coordinates IR Activities
Michael Shannon	Resolution PM	Resolution	215-244-7147	michael.shannon@aecom.com	Oversight of SAP Production
Lindsay Jones	Resolution Field Team	Resolution	215-244-7158	lindsay.jones@aecom.com	Field Team
Marty Schy	WG BRAC CSO	NAVFAC MIDLANT	215-293-4888	martin.schy@navy.mil	Local base contact
James Rugh	WG BRAC CSO	NAVFAC MIDLANT	215-293-4888	james.rugh@navy.mil	Local base contact

Comments/Decisions:

- Additional CERCLA site, Site Screening Area 12, was not included in 2006 Environmental Conditions report (newer site) and is currently identified as Site 12. This is not located on Parcel 1 or 2, but is adjacent. Sites 3, 5 and 12 to be mentioned in FOST relative to Parcels 1 and 2.
- Proposed property use map provided.
- Potential additional scopes of work – Maple Avenue parcel subsurface investigation, lead-based paint assessment for Building #139

Action Items:

- Items to be provided by WG BRAC staff – CERFA Report, CERFA Investigation Plan, Work Plan for CERFA Category 3, Land Environmentally Suitable for Transfer figure present in meeting conference room.

SAP Worksheet #10: Conceptual Site Model

(UFP-QAPP Manual Section 2.5.2)

The NAS JRB has been designated for closure under the Defense Base Realignment and Closure Act of 1990 and the transfer of Navy-owned property and redevelopment is pending. In accordance with the CERFA, uncontaminated Navy-owned property at the NAS JRB Willow Grove has been identified; however, several data gaps prevented the classification of several buildings and areas. CERFA Category 1 classification includes real property on which no hazardous substances and no petroleum products or their derivatives are known to have been released or disposed. CERFA Category 2 classification includes real property on which hazardous substances and/or petroleum products or their derivatives are known to have been released or disposed, including property where all response action necessary to protect human health and the environment with respect to hazardous substances or petroleum products/derivatives has been taken. Category 3 classification includes real property on which there is potential for hazardous substances and/or petroleum products or their derivatives to have been released or disposed, and some level of further evaluation is required to make this determination. This SAP has been designed to address those data gaps so that the property can be classified and if necessary a response action initiated.

Areas being investigated under this SAP include several buildings with potential lead-based paint, several buildings with transformers that may have contained PCBs, an area adjacent to a wash rack and oil water separator, and an area at which potential debris piles were observed on historical aerial photos. This SAP also outlines confirmatory sampling at several potential "hot-spot" soil removals planned as part of a separate activity.

The overall topography of the NAS JRB Willow Grove is flat with the base runway representing the highest local topographic feature. With the exception of the parcels designated as "CERFA 2013: Outside Land South – South of Maple Avenue" and "Outside Land South – South of Maple Avenue", the areas that are being investigated under this SAP are within the base fence line. Although redevelopment plans have not been finalized, the anticipated future usage of the NAS JRB Willow Grove includes a mixture of residential, recreational, and commercial development. The areas being investigated as part of this SAP are not currently being utilized. No ephemeral, intermittent, or perennial drainage ways, streams or tributaries are located within close proximity to the areas being evaluated under this SAP.

The overburden is generally ranges up to 20 feet bgs and consists of clay to clayey silt with minor amounts of sand. Disturbed soil is prevalent within the NAS JRB and large areas of made land have been filled with shale and sandstone mixed earth materials. Groundwater can generally be found at 5 to 25-feet bgs at the NAS JRB (Tetra Tech, 2011).

The following summarizes the known environmental conditions for the buildings and areas being investigated under this SAP.

- Buildings 63, 109, 110, 111, 112, 113, and 114 (Quarters) - Background documentation does not indicate whether lead-based paint was present on the exterior of the buildings; however, given the age of the structures the potential for lead-based paint to be present exists.
- Former Water Tower adjacent to Building 107/108 - Background information indicated peeling lead-based paint chips appear to have impacted soil in the vicinity of the former water tower. Two soil samples were found to exceed the PAL with concentrations up 1,472 ppm. The remaining samples were below the PAL.
- Building 15A – Previous investigations included the collection of a surface soil sample at the discharge of the boiler blow down pipe at Building 15A. Although no visible evidence of a release was observed, benzo(a)pyrene was found to exceed the MSC for Residential Soil. Several other polycyclic aromatic hydrocarbons were detected but did not exceed their respective Pennsylvania MSCs.
- Buildings 15B, 70, and 610 – Review of background documents and a site walkthrough indicated that transformers are present in Buildings 15B, 70, and 610. Given the age of the structures the potential exists that the transformers contained PCBs and may have leaked from the transformers onto adjacent surfaces.
- OWS and Wash Rack adjacent to Building 178 - An inspection conducted during the CERFA process indicated that an OWS and wash rack was present adjacent to Building 178. No data is available to verify whether release have occurred from these systems.
- Building 139 (North Lighting Vault) - There is no documentation as to whether Building 139 was assessed for lead-based paint. The 2006 Environmental Conditions Report indicates that an asbestos survey was conducted in this building in 1996. Due to the age of the building and the observation of peeling paint, soil contamination is possible at this building.
- "Outside Land South - South of Maple Avenue" - Aerial photos from 1973, 1977, and 1978 show potential debris pile scattered and soil disturbance around the interior of this parcel. No additional details are available regarding activities in this area during that time.

Residential structures appear around the perimeter of the parcel during that period. The parcel has since been acquired by the government for use as a flight approach clear zone and is currently vacant with no evidence of features visible in the aerial photos.

- "CERFA 2013: Additional Parcel South - South of Maple Avenue" – A concrete pad is present near an unnamed business park access road at the northern end of the parcel. Aerial photos and historical documents did not provide information regarding the use of the parcel and the pad. Clear evidence is not available as to whether hazardous materials were used or stored in this area.

Figures 10-1 through 10-6 illustrate the potential source areas, release mechanisms, affected media, exposure routes, human receptors and pathways. Ecological exposures scenarios are unlikely given the absence of targets in the vicinity of the areas being investigated and are were not considered.

SAP Worksheet #11: Project Quality Objectives/Systematic Planning Process Statements

(UFP-QAPP Manual Section 2.6.1)

The DQOs specify project objectives, data collection boundaries and limitations, the most appropriate type of data to collect, and the level of acceptable decision error. The quality and quantity of data required to implement environmental removal actions are also defined.

The DQOs, as defined through the seven-step process (EPA 2006a), are as follows:

11.1 Overview

The United States Environmental Protection Agency's *Guidance for Systematic Planning Using the Data Quality Objectives (DQO) Process* (USEPA, 2006) describes the process used to determine the type, quantity, and quality of data necessary to support decision-making regarding current site conditions and future site management. Inherent in the development of DQOs is a systematic and logical approach intended to yield an efficient sampling design based on accepted levels of potential decision errors. The following sections present the problem statement, decision criteria, information inputs, and the analytical approach, along with decision rules to be used for field activities at NAS JRB Willow Grove. Performance criteria, to assure data used to make project decisions are of sufficient quality, are also presented herein.

11.2 Problem Statement

Several areas at NAS JRB Willow Grove are being evaluated as follow-up CERFA actions as illustrated in Figure 11-1. The primary objective of this SAP is to address the CERFA data gaps so that uncontaminated property can be identified or impacts can be addressed prior to transfer. Specific issues to be addressed at the sites are as follows:

- **Buildings 63, 109, 110, 111, 112, 113, and 114 - Potential Lead Release to Soil near Quarters -** Review of background documentation did not indicate whether lead-based paint was present on the exterior of the buildings. Given the age of the structures the potential for lead-based paint to be present exists.
- **Former Water Tower adjacent to Building 107/108 - Lead Confirmation Sampling** - Review of background information indicated peeling lead-based paints appear to have impacted soil in the vicinity of the former water tower. Two samples were found to exceed the PAL with concentrations up 1,472 ppm. The remaining samples were below the PAL. The extent of the impacts is expected to be limited and not require further

delineation. "Hot-spot" excavation has been proposed to address the soil impacts and post-excavation sampling will be necessary to confirm the effectiveness of the remedy.

- **Building 15A - Boiler Blowdown Confirmation Sampling PAH Sampling -** Previous investigations included the collection of a surface soil sample at the discharge of the boiler blow down pipe at Building 15A. Although no visible evidence of a release was observed, benzo(a)pyrene was found to exceed the Pennsylvania MSC for Residential Soil. Several other PAHs were detected but did not exceed their respective MSCs. The extent of the impacts is expected to be limited and not require further delineation. A limited "hot-spot" excavation has been proposed to address the soil impacts and post-excavation sampling will be necessary to confirm the effectiveness of the remedy.
- **Buildings 15B, 70, and 610 - Potential PCB Releases -** Review of background documents and a site walkthrough indicated that transformers are present in Buildings 15B, 70, and 610. PCBs may have leaked from the transformers onto adjacent concrete surfaces.
- **Suspected Release from Oil Water Separator and Wash Rack adjacent to Building 178 -** An inspection conducted during the CERFA process indicated that an OWS and wash rack was present and may have resulted in a release.
- **Building 139 – North Lighting Vault -** There is no documentation as to whether Building 139 was assessed for lead-based paint. The 2006 Environmental Conditions Report indicates that an asbestos survey was conducted in this building in 1996. Since asbestos and lead-based paint were banned around the same time period, lead-based paint may be present at this building.
- **"Outside Land South - South of Maple Avenue" -** Aerial photos from 1973, 1977, and 1978 show potential debris piles scattered around the interior of this parcel. Residential structures appear around the perimeter of the parcel. The parcel has since been acquired by the government for use as a flight approach clear zone and is currently vacant with no evidence of features visible in the aerial photos. It could not be determined whether releases of hazardous substances and/or petroleum products or their derivatives have occurred related to prior uses observed in the aerial photos.
- **"CERFA 2013: Additional Parcel South - South of Maple Avenue" -** A concrete pad is present near an unnamed access road to a business park at the northern end of the parcel. A review of aerial photos and historical documents did not yield any clear evidence as to whether hazardous materials or petroleum products were used or stored in this area which may have resulted in a release.

11.3 Information Inputs

The data from previous investigations when available was used in conjunction with information presented the CERFA and Existing Environmental Conditions Report to evaluate current site conditions and to determine contaminants of concern for the media being evaluated. The full list of analytes is presented in Worksheet #15.

To resolve the problem statement, the following data must be collected at each of the sites:

- **Chemical Data** — Environmental media must be analyzed for potential site-related contaminants, as presented in Worksheet #15. The target analytes are based on the previous data where available and site history gathered from background documents including the CERFA Report and Environmental Conditions Report. Worksheet #15 lists all chemicals to be analyzed. Site-specific sampling methods and analyses are presented in Worksheets #18 and #20, and required analytical methods are presented in Worksheet #23. Resolution of the problem statement requires that analyte-specific concentrations be compared to the PALs in Worksheet #15.
- **Field Parameters/Observations** – Field observations, including soil classifications, evidence of staining, stressed vegetation, etc., will be recorded. Soil will also be screened with a PID for those sites at which VOC contamination is suspected. Sample locations will be recorded using a hand-held GPS device. This information will be used to refine the CSM to assist the evaluation of the nature and extent of contamination.
- **Location** — Sample locations will be recorded using a hand-held GPS device so that the analytical data can be analyzed in a spatial context.

11.3.1 Required Analyses and Frequency of Monitoring by Site

Requirements for the sampling and analysis for each media are described below. The locations and number of samples required are detailed in Worksheets #17 and #18. Additional detail (e.g., the methods and SOPs to be used) is provided in Worksheets #15, #19, and #21.

Matrix	Analysis	Frequency
Building 63, 109, 110, 111, 112, 113, and 114		
Soil	Lead	Approximately 5 surface soil samples per building (1 sample per 25 feet of dripline) for initial characterization, approximately 5 confirmatory samples post-excavation (if necessary) - exact number will be determined based on the size of the excavation
Former Water Tower adjacent to Building 107/108		
Soil	Lead	Approximately 5 confirmatory soil samples post-excavation, exact number will be determined based on the size of the excavation
Building 15A – Old Boiler Building		
Soil	PAHs	Approximately 3 confirmatory soil samples, exact number will be determined based on the size of the excavation
Buildings 15B, 70, and 610 – Potential PCB Releases		
Concrete	PCBs	3 concrete dust samples per building
Oil Water Separator and Wash Rack adjacent to Building 178		
Soil	VOCs, SVOCs, and metals	8 subsurface soil samples
Building 139 – North Lighting Vault		
Paint Chip	Lead	3 paint chip samples
"Outside Land South – South of Maple Avenue"		
Soil	VOCs, SVOCs, and metals	10 surface soil samples
"CERFA 2013: Additional Parcel South – South of Maple Avenue"		
Soil	VOCs, SVOCs, and metals	4 surface soil samples

11.3.2 Analytical Methods

Analytical methods were selected to be acceptable to PADEP and EPA and to provide sufficient PARCCS parameters. See Worksheets #19 and #23 for a list of the analytical methods.

11.3.3 Sampling Methods

Sampling methods were selected to be acceptable to PADEP and EPA and able to produce data which are consistent with the representativeness and comparability of previous data for the medium being sampled at each site. See Worksheet #21 for a list of sampling methods.

11.3.4 Project Action Levels

The analytical data must be compared to PALs to determine whether a contaminant release of potentially unacceptable magnitude has occurred. Worksheet #15 identifies the PALs, which are the minimum values of applicable criteria considered as potential action levels. Since the final use of the land has not been determined, the most stringent of the current EPA Region 3 Residential Soil SSLs; EPA Region 3 Protection of Groundwater SSLs; Pennsylvania MSCs for Residential Soil;

and the Pennsylvania Soil to Groundwater MSCs (Used Aquifer, TDS ≤ 2,500, Residential) were selected as the PALs for soil.

The PAL for the concrete samples was based on the bulk PCB remediation waste standard for high occupancy areas as defined under 40 CFR 761.61. The PAL for lead paint was based on the HUD standard of 5,000 mg/kg. The analytical methods by which target analyte concentrations will be measured were selected to achieve LOQs less than PALs, when possible.

All concentrations less than DLs will be reported as DL values with a "U" qualifier. Concentrations between the DL and LOQ will be reported as the measured values with a "J" qualifier to indicate the increased uncertainty in the reported concentration that arises as concentrations approach the detection limit. If a target analyte has a PAL between the DL and LOQ, the "J" flagged data will be accepted to achieve project goals. The inability to quantifiably compare individual analytes to PALs with confidence will be discussed in the risk evaluation uncertainty analysis in monitoring event reports.

11.4 Study Area Boundaries

Spatial Boundaries:

Figure 11-1 illustrates the overall locations of the study areas.

Buildings 63, 109, 110, 111, 112, 113, and 114 – Potential Lead Release to Soil near Quarters

The horizontal boundaries for the initial soil characterization activities will be a 3-foot swath around the perimeter of each building and will be limited to surface soil (0 to 6 inches bgs). For post-excavation work (if necessary), the limits of the confirmatory sampling will be defined by the boundaries of excavations. The excavations are not expected to exceed 2-feet in depth.

Former Water Tower adjacent to Building 107/108 Lead Confirmation Sampling

Confirmatory sampling will be defined by the limits of the excavation. The excavation is not expected to exceed 2-feet in depth.

Building 15A – Boiler Blowdown Confirmation Sampling PAH Sampling

Confirmatory sampling will be defined by the limits of the excavation. The excavation is not expected to exceed 2-feet in depth.

Buildings 15B, 70, and 610 – Potential PCB Releases

Concrete dust sampling will be limited to the building interior walls and floor and will focus on the areas immediately surrounding the transformers. Samples will be collected from a depth 0 to 2 cm.

Oil Water Separator and Wash Rack adjacent to Building 178

The area to be investigated is defined as a grassy area between the wash rack and oil/water separator with an approximate horizontal dimension of 50 feet by 35 feet as illustrated in Figure 11-2. The vertical limits of the investigation will be 10-feet below ground surface or the groundwater table whichever is encountered first. The selection of the subsurface soil sample interval will be based on visual observation and screening of VOCs with a PID. If no evidence of staining or elevated VOCs are observed, a sample will be collected from the bottom of the soil boring.

Building 139 – North Lighting Vault

Paint sampling will be limited to the building interior and exterior walls.

"Outside Land South – South of Maple Avenue "

This area encompasses an open field that is bound by Maple Avenue to the north, Easton Road to the east, and Girard Avenue to the south. The western boundary of the study area is defined by a row of trees approximately 700 feet from Easton Road. The horizontal area is approximately 700 feet by 500 feet. Investigation activities will be limited to surface soil (0 to 6 inches bgs) and focus on the areas of potential disturbance noted in aerial photos from 1973, 1977 and 1978. Figure 11-3 illustrates the boundaries of the investigation area.

"CERFA 2013: Additional Parcel South – South of Maple Avenue "

The area to be investigated is defined as the area immediately surrounding the concrete pad along an unnamed access road at the northern end of this parcel. Investigation activities will be limited to shallow surface soil (0 to 6 inches bgs) and focus on a swath within 5-feet of the perimeter of the concrete pad. Figure 11-4 illustrates the proposed sampling locations.

Temporal boundaries:

Sampling is expected to occur only once to determine whether constituents are present at concentrations above the PALs. Additional rounds of confirmatory samples may be collected if the additional soil excavation is necessary based on the analytical results of the initial confirmatory samples.

11.5 Decision Rules

The following decision rules will be used to resolve the problem statement for each site.

Decision Rule #1: No Further Action Rule

If contaminant concentrations in the samples are less than PALs, the Navy will recommend to PADEP and the EPA that no further action is necessary and that the area be classified as CERFA Category 1 - Uncontaminated Property. Otherwise, continue to next decision rule.

Decision Rule #2: Further Evaluation Rule

For Buildings 15B, 70, and 610 – Potential PCB Releases; Building 139 – North Lighting Vault; Oil Water Separator and Wash Rack adjacent to Building 178; "Outside Land South – South of Maple Avenue"; and "CERFA 2013: Additional Parcel South – South of Maple Avenue"

If constituents are detected above the PAL's the building or area will be classified as CERFA Category 2 - Known Release and/or Disposal. Follow up actions to address the release will be evaluated.

Decision Rule #3: Limited "Hot-Spot" Removal Action

For Buildings 63, 109, 110, 111, 112, 113, and 114 – Potential Lead Release to Soil near Quarters

If lead in excess of the PAL is present in the surface soil samples, then the Navy will proceed with a limited "hot-spot" soil removal. Following the soil removal, confirmatory soil samples will be collected to verify the effectiveness of the removal action. If the confirmatory soil samples results do not exceed the PAL, then no further action will be recommended. If the confirmatory soil samples results exceed the PAL, further soil removal and confirmatory soil sampling will be conducted.

Former Water Tower adjacent to Building 107/108 Lead Confirmation Sampling

Following the limited "hot-spot" soil removal confirmatory soil samples will be collected to verify the effectiveness of the removal action. If the confirmatory soil samples results do not exceed the PAL, then no further action will be recommended. If the confirmatory soil samples results exceed the PAL, further soil removal and confirmatory soil sampling will be conducted.

Building 15A – Boiler Blowdown Confirmation Sampling PAH Sampling

Following the limited "hot-spot" soil removal confirmatory soil samples will be collected to verify the effectiveness of the removal action. If the confirmatory soil samples results do not exceed the PAL, then no further action will be recommended. If the confirmatory soil samples results exceed PALs, further soil removal and confirmatory soil sampling will be conducted.

11.6 Performance or Acceptance Criteria

The data will be concluded to be of sufficient type, number, and quality if they satisfy the data validation criteria and usability assessment requirements. In general, this requires that the data be representative of the targeted environmental media, that the data be generated by sufficiently sensitive analytical methods that are operating within QC limits, and that the data are considered comparable in terms of quality and representativeness in light of project objectives and decision rules. Laboratory QC limits and PALs are presented in subsequent sections.

SAP Worksheet #12-1: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Soil

Analytical Group: Polycyclic Aromatic Hydrocarbons (Full Scan and/or Selected Ion Monitoring)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank[1]	Polycyclic Aromatic Hydrocarbons	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥5 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-1

SAP Worksheet #12-2: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Soil and Paint Chips

Analytical Group: ICP-AES Metals

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank[1]	ICP-MS Metals	One per day of sampling per type of equipment used	Accuracy/Bias	No target metals> ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value must be < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥5 x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-2

SAP Worksheet #12-3: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Soil

Analytical Group: Mercury (CVAA)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank[1]	Mercury (CVAA)	One per day of sampling per type of equipment used	Accuracy/Bias	No mercury > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥5 x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-3

SAP Worksheet #12-4: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Soil

Analytical Group: Volatile Organic Compounds

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Trip Blank	Volatile Organic Compounds (Full Scan)	One per cooler containing VOC Samples	Accuracy/Bias	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Equipment Rinsate Blank[1]		One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-4

SAP Worksheet #12-5: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Soil

Analytical Group: Semivolatile Organic Compounds

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank[1]	Semivolatile Organic Compounds (Full Scan)	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-1

SAP Worksheet #12-6: Measurement Performance Criteria – Field QC Samples

(UFP-QAPP Manual Section 2.6.2)

Matrix: Concrete

Analytical Group: Polychlorinated Biphenyls (Aroclors)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank[1]	Polychlorinated Biphenyls (Aroclors)	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-5

Notes:

1 – Equipment rinsate blanks will be collected if decontamination is required and will not apply if dedicated equipment is used.

SAP Worksheet #14: Summary of Project Tasks

(UFP-QAPP Manual Section 2.8.1)

Clearing

Prior to the initiation of intrusive field work, Resolution and the Navy will conduct a site visit to mark out the proposed sampling locations. The mark out of the locations will be utilized for utility clearance (described below).

Utility Clearance

Intrusive field investigation activities related to the oil water separator and wash rack are planned adjacent to Building 178. Prior to the initiation of this field work, utility clearance will be conducted in accordance with SOP 3-01.

Drilling and Subsurface Soil Sample Collection

Soil borings will be installed and subsurface soil samples will be collected from a grassy area near the OWS and wash rack system adjacent to Building 178. The proposed boring locations are illustrated in Figure 11-2. The proposed locations may be adjusted in the field based on the presence of subsurface hazards. Please refer to Worksheet 11-1 for the sampling rationale.

The borings will be advanced using DPT drill rig in accordance with SOP 3-17. Soil cores will be collected continuously via acetate liners for visual description of soil composition and VOC screening using a PID in accordance with SOPs 3-16, 3-20 and 3-21. The borings will be advanced to a depth of approximately 10-feet bgs or groundwater, whichever occurs first.

One soil sample will be collected from each boring. The sample depth interval will be selected based on visual evidence of staining or elevated VOC readings. If no evidence of staining or elevated VOC readings is observed, a sample will be collected from the bottom of the soil boring. All soil samples will be analyzed for VOCs, SVOCs, and metals.

Surface Soil Sampling

Surface soil samples will be collected at Buildings 63, 109, 110, 111, 112, 113, and 114 and the parcels identified as "Outside Land South – South of Maple Avenue" and "CERFA 2013: Additional Parcel South – South of Maple Avenue" as illustrated in Figures 11-1, 11-3, and 11-4. Surface soil samples will be collected in accordance with SOP 3-21. Surface soil samples will be collected using dedicated poly scoops, homogenized in a stainless steel bowl and then transferred to their sample containers. Those samples that will be collected for VOC analysis will be transferred to sample containers prior to being homogenized. The samples collected at Buildings 63, 109, 110, 111, 112,

113, and 114 will be analyzed for lead. The samples collected at the parcels identified as "Outside Land South – South of Maple Avenue" and "CERFA 2013: Additional Parcel South – South of Maple Avenue" will be analyzed for VOCs, SVOCs, and metals.

Concrete Sampling

Concrete dust samples will be collected from Buildings 15B, 70 and 610. The concrete dust samples will be collected from surfaces immediately adjacent to the transformers biased towards areas of obvious staining if present. An impact drill with a 1.25-inch drill bit will be used to obtain concrete dust. Each concrete dust sample will be composited from six shallow holes 0 to 2 cm in depth located in close proximity to each other. For the samples collected from the floors a stainless steel spoon will be used to collect the concrete dust from each hole. When concrete dust samples are collected from walls, a dedicated plastic bag will be taped to the wall directly underneath the sampling area to collect the dust. The concrete dust homogenized in a stainless steel bowl before being transferred to a sample container. The drill bit, spoon, and stainless steel bowl will be decontaminated prior to and in between sample locations with Alconox and water.

Lead Paint Sampling

Paint chip samples will be collected from Building 139. Up to three different paint surfaces on the exterior walls will be sampled using a metal hand scraper. Surfaces will be selected for sampling to be representative of different paint types. Samples will be collected by scraping the paint down to the bare material. A plastic bag will be taped below the sampling location to collect the paint chips before being transferred to the sample container. The hand scraper will be decontaminated in between sample locations with Alconox and water.

Post-Excavation Confirmatory Soil Sampling

Limited "hot-spot" soil removal is anticipated at related to PAH-impacted soil at Building 15A (former boiler building) and lead-impacted soil at the Former Water Tower adjacent to Building 107/108. Additional confirmatory soil sampling may be necessary at Buildings 63, 109, 110, 111, 112, 113, and 114 if the initial characterization activities discussed above indicate that limited "hot-spot" removal of lead-impacted soil is necessary. Confirmatory soil samples will be collected from the excavation sidewalls and bottom. The exact number and locations of the confirmatory samples will be adjusted in the field based on nature and extent of the excavations. At least one confirmatory soil sample will be collected from each excavation sidewall and bottom.

All excavations are expected to be shallow (less than 2 feet bgs). Confirmatory soil samples will be collected from the excavation sidewalls and bottom using dedicated poly scoops. The samples will be homogenized in a stainless steel bowl prior to being transferred into the sample containers.

Sample Handling

All samples will be preserved in accordance to this SAP. Upon collection the samples will be placed in coolers on ice and shipped to the laboratory chilled to less than 6 degrees °C. Samples will be shipped on the day of sampling or as soon as logistically possible. All samples will be handled under appropriate chain-of-custody procedures.

Quality Assurance/Quality Control

The QA/QC sample collection frequency is as follows (also shown in Worksheet #20):

Equipment blanks - 1 per day per type of sampling equipment used for those methods and matrices for which they are included.
Trip blanks - 1 per cooler containing VOC samples
Field duplicates – (single blind samples) 1 per 20 samples per method and matrix
MS/MSD or MS/Matrix Duplicate - 1 per 20 samples per method and matrix

Equipment Decontamination

To the maximum extent possible, Resolution will utilize dedicated and disposable sampling equipment to avoid the potential for cross contamination of samples due to inadequate decontamination processes. The dedicated sampling equipment will include plastic scoops, acetate liners, disposable gloves, and laboratory supplied sample bottles. Non-disposable or non-dedicated sampling equipment will be decontaminated prior to sampling and between samples. Cleaning of equipment is performed to prevent cross-contamination between samples and to maintain a clean working environment for all personnel. Decontamination will generally consist of a water rinse station to remove gross contamination (if needed), followed by a non-phosphate detergent (e.g., Alconox) water rinse, and a rinse with de-ionized water. If equipment is to be stored or transported, it will be wrapped in aluminum foil after air-drying. DPT drill rig tools will be decontaminated between each bore hole. All decontamination water generated during decontamination of sampling equipment will be containerized as IDW and properly disposed of.

Investigation-Derived Waste Management

The IDW, consisting of soil cuttings, water generated during decontamination processes and PPE will be collected in properly labeled 55-gallon drums and temporarily stored on the site for subsequent off-site disposal. Subsequently, the containers will be characterized with laboratory analyses and properly disposed at a Navy approved disposal facility.

Laboratory Coordination, Data Management and Validation

Resolution's Project Chemist will track the samples from collections through analysis and obtain data packets from the laboratories within the appropriate turn-around-time of sample receipt. A signed certificate of analysis will be provided in the narrative section of each laboratory data package. The laboratory will submit the data in hard copy and an electronic format.

Analytical results will be validated according to the procedures in Worksheet #36. Resolution will be provided with the hard copy and electronic version of the laboratory. The hardcopy and electronic versions will be examined for completeness and accuracy. The electronic copy will be compared to the hardcopy results by Resolution's Project Chemist and then loaded into the Resolution Sharepoint site and database.

SAP Worksheet #15-1: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil

Analytical Group: VOCs

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
1,1,1-Trichloroethane	71-55-6	20	PA SWHS (Soil to Groundwater)	0.07	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00034
1,1,2,2-Tetrachloroethane	79-34-5	0.08	PA SWHS (Soil to Groundwater)	0.000026	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00044
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	10,000	PA SWHS (Direct Contact)	130	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0025	0.0021
1,1,2-Trichloroethane	79-00-5	0.5	PA SWHS (Soil to Groundwater)	0.000077	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00057
1,1-Dichloroethane	75-34-3	3.1	PA SWHS (Soil to Groundwater)	0.00068	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00046

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
1,1-Dichloroethene	75-35-4	0.7	PA SWHS (Soil to Groundwater)	0.0025	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.0004
1,2,3-Trichlorobenzene	87-61-6	No standard	PA SWHS	0.015	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00036
1,2,4-Trichlorobenzene	120-82-1	27	PA SWHS (Soil to Groundwater)	0.0029	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00045
1,2-Dibromo-3-chloropropane	96-12-8	0.029	PA SWHS (Direct Contact)	0.00000014	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00092
1,2-Dibromoethane	106-93-4	0.005	PA SWHS (Soil to Groundwater)	0.0000018	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00048
1,2-Dichlorobenzene	95-50-1	60	PA SWHS (Soil to Groundwater)	0.27	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00022
1,2-Dichloroethane	107-06-2	0.5	PA SWHS (Soil to Groundwater)	0.000042	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00055

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
1,2-Dichloropropane	78-87-5	0.5	PA SWHS (Soil to Groundwater)	0.00013	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00039
1,3-Dichlorobenzene	541-73-1	61	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.01	0.005	0.0003	0.00017
1,4-Dichlorobenzene	106-46-7	10	PA SWHS (Soil to Groundwater)	0.0004	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00024
1,4-Dioxane	123-91-1	0.64	PA SWHS (Soil to Groundwater)	0.00014	USEPA RSL Protection of Groundwater SSL	1.0	0.5	0.1	0.083
2-Butanone	78-93-3	400	PA SWHS (Soil to Groundwater)	1.0	USEPA RSL Protection of Groundwater SSL	0.02	0.01	0.005	0.0043
2-Hexanone	591-78-6	1.1	PA SWHS (Soil to Groundwater)	0.0079	USEPA RSL Protection of Groundwater SSL	0.02	0.01	0.0025	0.0015
4-Methyl-2-pentanone	108-10-1	290	PA SWHS (Soil to Groundwater)	0.23	USEPA RSL Protection of Groundwater SSL	0.02	0.01	0.0006	0.00049

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Acetone	67-64-1	3,300	PA SWHS (Soil to Groundwater)	2.4	USEPA RSL Protection of Groundwater SSL	0.04	0.02	0.0024	0.0011
Benzene	71-43-2	0.5	PA SWHS (Soil to Groundwater)	0.0002	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00028
Bromochloromethane	74-97-5	9	PA SWHS (Soil to Groundwater)	0.021	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.0012
Bromodichloromethane	75-27-4	8	PA SWHS (Soil to Groundwater)	0.000032	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00036
Bromoform	75-25-2	8	PA SWHS (Soil to Groundwater)	0.0021	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00064
Bromomethane	74-83-9	1	PA SWHS (Soil to Groundwater)	0.0018	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.0007
Carbon disulfide	75-15-0	150	PA SWHS (Soil to Groundwater)	0.21	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00059

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Carbon tetrachloride	56-23-5	0.5	PA SWHS (Soil to Groundwater)	0.00015	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00059
Chlorobenzene	108-90-7	10	PA SWHS (Soil to Groundwater)	0.049	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00029
Chloroethane	75-00-3	23	PA SWHS (Soil to Groundwater)	5.9	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00099
Chloroform	67-66-3	8	PA SWHS (Soil to Groundwater)	0.000053	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00036
Chloromethane	74-87-3	3	PA SWHS (Soil to Groundwater)	0.049	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00024
cis-1,2-Dichloroethene	156-59-2	7	PA SWHS (Soil to Groundwater)	0.0082	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00045
cis-1,3-Dichloropropene	10061-01-5	No standard	PA SWHS	No standard	USEPA RSL	0.01	0.005	0.0003	0.00024

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Cyclohexane	1735-17-7	1,700	PA SWHS (Soil to Groundwater)	13	USEPA RSL Protection of Groundwater SSL	0.1	0.05	#N/A	#N/A
Dibromochloromethane	124-48-1	8	PA SWHS (Soil to Groundwater)	0.000039	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00035
Dichlorodifluoromethane	75-71-8	100	PA SWHS (Soil to Groundwater)	0.3	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00083
Ethylbenzene	100-41-4	70	PA SWHS (Soil to Groundwater)	0.0015	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00039
Isopropylbenzene	98-82-8	600	PA SWHS (Soil to Groundwater)	0.64	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00023
Methyl acetate	79-20-9	3,700	PA SWHS (Soil to Groundwater)	3.2	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00098
Methylcyclohexane	108-87-2	No standard	PA SWHS	No standard	USEPA RSL	0.01	0.005	0.0012	0.00041
Methylene chloride	75-09-2	0.5	PA SWHS (Soil to Groundwater)	0.0013	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00024

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Methyl-tert-butyl ether	1634-04-4	2	PA SWHS (Soil to Groundwater)	0.0028	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.0004
o-Xylene	95-47-6	66 (total)	PA SWHS (Direct Contact)	0.19	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00008
p/m-Xylene	179601-23-1	66 (total)	PA SWHS (Direct Contact)	0.18	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00021
Styrene	100-42-5	24	PA SWHS (Soil to Groundwater)	0.11	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0003	0.00018
Tetrachloroethene	127-18-4	0.5	PA SWHS (Soil to Groundwater)	0.0023	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00046
Toluene	108-88-3	100	PA SWHS (Soil to Groundwater)	0.59	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00035
trans-1,2-Dichloroethene	156-60-5	10	PA SWHS (Soil to Groundwater)	0.025	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00054

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
trans-1,3-Dichloropropene	10061-02-6	No standard	PA SWHS	No standard	USEPA RSL	0.01	0.005	0.0003	0.00029
Trichloroethene	79-01-6	0.5	PA SWHS (Soil to Groundwater)	0.00016	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00064
Trichlorofluoromethane	75-69-4	200	PA SWHS (Soil to Groundwater)	0.69	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00055
Vinyl chloride	75-01-4	0.2	PA SWHS (Soil to Groundwater)	0.000053	USEPA RSL Protection of Groundwater SSL	0.01	0.005	0.0012	0.00033

Notes:

State PALs were selected based on the lower of the following sources:

- PA SWHS (Soil to Groundwater) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil to Groundwater (Used Aquifer, Total Dissolved Solids <= 2,500, Residential). January 2011. The Soil to Groundwater MSC is the highest of the 100X the Groundwater MSC and the Generic Value.
- PA SWHS (Direct Contact) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil Direct Contact (Residential). January 2011.
- In the event that a LOD is above the PAL, the laboratory will report the LOD with a "U" qualifier to indicate that the result was not detected above the LOD.

Federal PALs were selected based on the lower of the following sources:

- USEPA RSL Residential Soil = USEPA Regional Screening Level for Residential Soil. November 2012. Values adjusted for a target hazard quotient of 0.1 to account for cumulative effects on the same target organ.
- USEPA RSL Protection of Groundwater SSL= = USEPA Regional Screening Level. Protection of Groundwater Soil Screening Level (SSL). November 2012.

SAP Worksheet #15-2: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil

Analytical Group: SVOCs

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Benzaldehyde	100-52-7	No standard	PA SWHS	0.33	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.017
Phenol	108-95-2	200	PA SWHS (Soil to Groundwater)	2.6	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.009
Bis(2-chloroethyl) ether	111-44-4	0.015	PA SWHS (Soil to Groundwater)	0.0000031	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0092
2-Chlorophenol	95-57-8	4.4	PA SWHS (Soil to Groundwater)	0.057	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0092
2-Methylphenol	95-48-7	180	PA SWHS (Soil to Groundwater)	0.58	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.006

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
2,2'-Oxybis(1-choloropropane)	108-60-1	30	PA SWHS (Soil to Groundwater)	0.00011	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.011
Acetophenone	98-86-2	370	PA SWHS (Soil to Groundwater)	0.45	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.018
4-Methylphenol	106-44-5	18	PA SWHS (Soil to Groundwater)	1.1	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.033	0.012
N-Nitroso-di-n propylamine	621-64-7	0.0094	PA SWHS (Soil to Groundwater)	0.000007	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.013
Hexachloroethane	67-72-1	0.56	PA SWHS (Soil to Groundwater)	0.00048	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0089
Nitrobenzene	98-95-3	7.3	PA SWHS (Soil to Groundwater)	0.000079	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0054
Isophorone	78-59-1	10	PA SWHS (Soil to Groundwater)	0.022	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0074

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
2-Nitrophenol	88-75-5	29	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.3	0.13	0.033	0.018
2,4-Dimethylphenol	105-67-9	73	PA SWHS (Soil to Groundwater)	0.32	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.012
Bis(2-chloroethoxy) methane	111-91-1	11	PA SWHS (Soil to Groundwater)	0.011	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.01
2,4-Dichlorophenol	120-83-2	2	PA SWHS (Soil to Groundwater)	0.041	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.01
Naphthalene	91-20-3	25	PA SWHS (Soil to Groundwater)	0.00047	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0139
4-Chloroaniline	106-47-8	0.42	PA SWHS (Soil to Groundwater)	0.00013	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0068
Hexachlorobutadiene	87-68-3	10	PA SWHS (Soil to Groundwater)	0.0005	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.011

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Caprolactam	105-60-2	No standard	PA SWHS	1.9	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.017
4-Chloro-3-methylphenol	59-50-7	37	PA SWHS (Soil to Groundwater)	1.3	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0084
2-Methylnaphthalene	91-57-6	600	PA SWHS (Soil to Groundwater)	0.14	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0099
Hexachlorocyclopentadiene	77-47-4	91	PA SWHS (Soil to Groundwater)	0.07	USEPA RSL Protection of Groundwater SSL	0.7	0.33	0.083	0.024
2,4,6-Trichlorophenol	88-06-2	11	PA SWHS (Soil to Groundwater)	0.013	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0098
2,4,5-Trichlorophenol	95-95-4	2,300	PA SWHS (Soil to Groundwater)	3.3	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0093
1,1'-Biphenyl	92-52-4	790	PA SWHS (Soil to Groundwater)	0.0087	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.01

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
2-Chloronaphthalene	91-58-7	6,200	PA SWHS (Soil to Groundwater)	2.9	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.011
2-Nitroaniline	88-74-4	11	PA SWHS (Soil to Groundwater)	0.062	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.033	0.023
Dimethylphthalate	131-11-3	No standard	PA SWHS	No standard	USEPA RSL	0.15	0.067	0.0166	0.011
2,6-Dinitrotoluene	606-20-2	3.7	PA SWHS (Soil to Groundwater)	0.02	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.033	0.017
Acenaphthylene	208-96-8	2,500	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.15	0.067	0.0166	0.0131
3-Nitroaniline	99-09-2	1.1	PA SWHS (Soil to Groundwater)	0.0014	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.066	0.039
Acenaphthene	83-32-9	2,700	PA SWHS (Soil to Groundwater)	4.1	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0101
2,4-Dinitrophenol	51-28-5	7.3	PA SWHS (Soil to Groundwater)	0.034	USEPA RSL Protection of Groundwater SSL	0.7	0.33	0.165	0.11

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
4-Nitrophenol	100-02-7	6	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.7	0.33	0.165	0.096
Dibenzofuran	132-64-9	95	PA SWHS (Soil to Groundwater)	0.11	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.01
2,4-Dinitrotoluene	121-14-2	0.21	PA SWHS (Soil to Groundwater)	0.00028	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.033	0.018
Diethylphthalate	84-66-2	2,900	PA SWHS (Soil to Groundwater)	4.7	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.011
Fluorene	86-73-7	3,000	PA SWHS (Soil to Groundwater)	4.0	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0127
4-Chlorophenyl-phenyl ether	7005-72-3	No standard	PA SWHS	No standard	USEPA RSL	0.15	0.067	0.0166	0.011
4-Nitroaniline	100-01-6	3.3	PA SWHS (Soil to Groundwater)	0.0014	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.033	0.019
4,6-Dinitro-2-methylphenol	534-52-1	0.37	PA SWHS (Soil to Groundwater)	0.002	USEPA RSL Protection of Groundwater SSL	0.7	0.33	0.165	0.13

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
N-Nitrosodiphenylamine	86-30-6	20	PA SWHS (Soil to Groundwater)	0.057	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0086
1,2,4,5-Tetrachlorobenzene	95-94-3	5.1	PA SWHS (Soil to Groundwater)	0.0058	USEPA RSL Protection of Groundwater SSL	0.7	0.033	0.02	0.01
4-Bromophenyl-phenylether	101-55-3	No standard	PA SWHS	No standard	USEPA RSL	0.15	0.067	0.0166	0.0098
Hexachlorobenzene	118-74-1	0.96	PA SWHS (Soil to Groundwater)	0.00053	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.015
Atrazine	1912-24-9	0.3	PA SWHS (Soil to Groundwater)	0.00017	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.017
Pentachlorophenol	87-86-5	5	PA SWHS (Soil to Groundwater)	0.00036	USEPA RSL Protection of Groundwater SSL	0.7	0.33	0.165	0.14
Phenanthrene	85-01-8	10,000	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.15	0.067	0.0166	0.0134
Anthracene	120-12-7	350	PA SWHS (Soil to Groundwater)	42	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0146

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Carbazole	86-74-8	21	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.15	0.067	0.0166	0.014
Di-n-butylphthalate	84-74-2	1,500	PA SWHS (Soil to Groundwater)	1.7	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.018
Fluoranthene	206-44-0	3,200	PA SWHS (Soil to Groundwater)	70	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0104
Pyrene	129-00-0	2,200	PA SWHS (Soil to Groundwater)	9.5	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0143
Butylbenzylphthalate	85-68-7	3,000	PA SWHS (Soil to Groundwater)	0.2	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.022
3,3'-Dicholorobenzidine	91-94-1	8.3	PA SWHS (Soil to Groundwater)	0.0007	USEPA RSL Protection of Groundwater SSL	0.3	0.13	0.066	0.036
Benzo(a)anthracene	56-55-3	5.7	PA SWHS (Direct Contact)	0.01	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0109

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Chrysene	218-01-9	230	PA SWHS (Soil to Groundwater)	1.1	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.0103
Bis(2-ethylhexyl) phthalate	117-81-7	130	PA SWHS (Soil to Groundwater)	1.1	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.0166	0.012
Di-n-octylphthalate	117-84-0	8,800	PA SWHS (Direct Contact)	53	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.032
Benzo(b) fluoranthene	205-99-2	5.7	PA SWHS (Direct Contact)	0.035	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.0223
Benzo(k) fluoranthene	207-08-9	57	PA SWHS (Direct Contact)	0.35	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.0272
Benzo(a) pyrene	50-32-8	0.57	PA SWHS (Direct Contact)	0.0035	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.0241
Indeno(1,2,3,-cd) pyrene	193-39-5	5.7	PA SWHS (Direct Contact)	0.15	USEPA RSL Residential Soil	0.15	0.067	0.02	0.0097

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Dibenzo(a,h) anthracene	53-70-3	0.57	PA SWHS (Direct Contact)	0.011	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.033	0.0219
Benzo(g,h,i) perylene	191-24-2	180	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	0.15	0.067	0.033	0.0225
2,3,4,6-Tetrachlorophenol	58-90-2	1,700	PA SWHS (Soil to Groundwater)	1.1	USEPA RSL Protection of Groundwater SSL	0.15	0.067	0.03	0.01

Notes:

State PALs were selected based on the lower of the following sources:

- PA SWHS (Soil to Groundwater) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil to Groundwater (Used Aquifer, Total Dissolved Solids <= 2,500, Residential). January 2011. The Soil to Groundwater MSC is the highest of the 100X the Groundwater MSC and the Generic Value.
- PA SWHS (Direct Contact) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil Direct Contact (Residential). January 2011.

Federal PALs were selected based on the lower of the following sources:

- USEPA RSL Residential Soil = USEPA Regional Screening Level for Residential Soil. November 2012. Values adjusted for a target hazard quotient of 0.1 to account for cumulative effects on the same target organ.
- USEPA RSL Protection of Groundwater SSL= = USEPA Regional Screening Level. Protection of Groundwater Soil Screening Level (SSL). November 2012.

SAP Worksheet #15-3: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil

Analytical Group: PAHs

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Acenaphthene	83-32-9	2,700	PA SWHS (Soil to Groundwater)	4.1	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00083
Acenaphthylene	208-96-8	2,500	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	1.0	0.0033	0.00133	0.00095
Anthracene	120-12-7	350	PA SWHS (Soil to Groundwater)	42	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00051
Benzo(a)anthracene	56-55-3	5.7	PA SWHS (Direct Contact)	0.01	USEPA RSL Protection of Groundwater SSL	0.005	0.0033	0.00133	0.00059
Benzo(a)pyrene	50-32-8	0.57	PA SWHS (Direct Contact)	0.0035	USEPA RSL Protection of Groundwater SSL	0.0033	0.0033	0.00133	0.00066

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Benzo(b)fluoranthene	205-99-2	5.7	PA SWHS (Direct Contact)	0.035	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.0005
Benzo(g,h,i)perylene	191-24-2	180	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	1.0	0.0033	0.00133	0.00065
Benzo(k)fluoranthene	207-08-9	57	PA SWHS (Direct Contact)	0.35	USEPA RSL Protection of Groundwater SSL	1,0	0.0033	0.00133	0.00048
Chrysene	218-01-9	570	PA SWHS (Direct Contact)	1.1	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00045
Dibenzo(a,h)anthracene	53-70-3	0.57	PA SWHS (Direct Contact)	0.011	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00051
Fluoranthene	206-44-0	3,200	PA SWHS (Soil to Groundwater)	70	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00042
Fluorene	86-73-7	3,000	PA SWHS (Soil to Groundwater)	4.0	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00057

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Indeno(1,2,3-cd)pyrene	193-39-5	5.7	PA SWHS (Soil to Groundwater)	0.15	USEPA RSL Residential Soil	1.0	0.0033	0.00133	0.001
2-Methylnaphthalene	91-57-6	600	PA SWHS (Soil to Groundwater)	0.14	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00099
Naphthalene	91-20-3	25	PA SWHS (Soil to Groundwater)	0.00047	USEPA RSL Protection of Groundwater SSL	1.0	0.0033	0.00133	0.00097
Phenanthrene	85-01-8	10,000	PA SWHS (Soil to Groundwater)	No standard	USEPA RSL	1.0	0.0033	0.00133	0.00072
Pyrene	129-00-0	2,200	PA SWHS (Soil to Groundwater)	9.5	USEPA SSL Protection of Groundwater	1.0	0.0033	0.00133	0.0005

Notes:
State PALs were selected based on the lower of the following sources:

- PA SWHS (Soil to Groundwater) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil to Groundwater (Used Aquifer, Total Dissolved Solids <= 2,500, Residential). January 2011. The Soil to Groundwater MSC is the highest of the 100X the Groundwater MSC and the Generic Value.
- PA SWHS (Direct Contact) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil Direct Contact (Residential). January 2011.

Federal PALs were selected based on the lower of the following sources:

- USEPA RSL Residential Soil = USEPA Regional Screening Level for Residential Soil. November 2012. Values adjusted for a target hazard quotient of 0.1 to account for cumulative effects on the same target organ.
- USEPA RSL Protection of Groundwater SSL= = USEPA Regional Screening Level. Protection of Groundwater Soil Screening Level (SSL). November 2012.

SAP Worksheet #15-4: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil

Analytical Group: Metals

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Aluminum	7429-90-5	190,000	PA SWHS (Direct Contact)	7,700	USEPA RSL Residential Soil	20	10	5	1.28
Antimony	7440-36-0	27	PA SWHS (Soil to Groundwater)	0.27	USEPA RSL Protection of Groundwater SSL	1.0	0.5	0.25	0.18
Arsenic	7440-38-2	12	PA SWHS (Residential, Direct Contact)	0.0013	USEPA RSL Protection of Groundwater SSL	1.0	0.5	0.25	0.19
Barium	7440-39-3	8,200	PA SWHS (Soil to Groundwater)	82	USEPA RSL Protection of Groundwater SSL	2.5	1.3	0.25	0.09
Beryllium	7440-41-7	320	PA SWHS (Soil to Groundwater)	3.2	USEPA RSL Protection of Groundwater SSL	1.0	0.2	0.1	0.03

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Cadmium	7440-43-9	38	PA SWHS (Soil to Groundwater)	0.38	USEPA RSL Protection of Groundwater SSL	0.2	0.1	0.02	0.01
Calcium	7440-70-2	No standard	PA SWHS	No standard	USEPA RSL	500	250	50	17.72
Chromium	7440-47-3	190 (CR+6)	PA SWHS (Soil to Groundwater)	180,000	USEPA RSL Protection of Groundwater SSL	1.0	0.25	0.125	0.05
Cobalt	7440-48-4	50	PA SWHS (Soil to Groundwater)	0.21	USEPA RSL Protection of Groundwater SSL	2.5	1.3	0.25	0.09
Copper	7440-50-8	43,000	PA SWHS (Soil to Groundwater)	22	USEPA RSL Protection of Groundwater SSL	1.0	0.25	0.125	0.05
Iron	7439-89-6	150,000	PA SWHS (Direct Contact)	270	USEPA RSL Protection of Groundwater SSL	10	5	2.5	1.65
Lead	7439-92-1	450	PA SWHS (Soil to Groundwater)	14	USEPA RSL Protection of Groundwater SSL	1.0	0.5	0.25	0.09
Magnesium	7439-95-4	No standard	PA SWHS	No standard	USEPA RSL	500	250	50	18.44

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Manganese	7439-96-5	2,000	PA SWHS (Soil to Groundwater)	21	USEPA RSL Protection of Groundwater SSL	2.0	0.75	0.15	0.06
Mercury	7439-97-6	10	PA SWHS (Soil to Groundwater)	2.3 (mercuric chloride)	USEPA RSL Residential Soil	1.0	0.083	0.0167	0.01
Nickel	7440-02-0	650	PA SWHS (Soil to Groundwater)	20	USEPA RSL Protection of Groundwater SSL	4	2	0.4	0.15
Potassium	7440-09-7	No standard	PA SWHS	No standard	USEPA RSL	500	250	25	10.98
Selenium	7782-49-2	26	PA SWHS (Soil to Groundwater)	0.26	USEPA RSL Protection of Groundwater SSL	1.0	0.5	0.25	0.17
Silver	7440-22-4	84	PA SWHS (Soil to Groundwater)	0.6	USEPA RSL Protection of Groundwater SSL	0.5	0.25	0.125	0.04
Sodium	7440-23-5	No standard	PA SWHS	No standard	USEPA RSL	500	250	50	17.13
Thallium	7440-28-0	14	PA SWHS (Soil to Groundwater)	0.011	USEPA RSL Protection of Groundwater SSL	5.0	2.5	0.5	0.25

Analyte	CAS No.	State Project Action Limit (mg/kg)	State Project Action Limit Reference[1]	Federal Project Action Limit (mg/kg)	Federal Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
							Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Vanadium	7440-62-2	1,500	PA SWHS (Direct Contact)	39	USEPA RSL Residential Soil	5.0	2.5	0.5	0.15
Zinc	7440-66-6	12,000	PA SWHS (Soil to Groundwater)	290	USEPA RSL Protection of Groundwater SSL	5.0	2.5	1.25	0.34

Notes:

State PALs were selected based on the lower of the following sources:

- PA SWHS (Soil to Groundwater) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil to Groundwater (Used Aquifer, Total Dissolved Solids <= 2,500, Residential). January 2011. The Soil to Groundwater MSC is the highest of the 100X the Groundwater MSC and the Generic Value.
- PA SWHS (Direct Contact) = Pennsylvania Statewide Health Standards. Medium-Specific Concentrations (MSCs) for Soil Direct Contact (Residential). January 2011.

Federal PALs were selected based on the lower of the following sources:

- USEPA RSL Residential Soil = USEPA Regional Screening Level for Residential Soil. November 2012. Values adjusted for a target hazard quotient of 0.1 to account for cumulative effects on the same target organ.
- USEPA RSL Protection of Groundwater SSL= = USEPA Regional Screening Level. Protection of Groundwater Soil Screening Level (SSL). November 2012.

SAP Worksheet #15-5: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Paint Chips

Analytical Group: Metals (Lead Only)

Analyte	CAS No.	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
					Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Lead	7439-92-1	5,000	HUD Lead Based Paint Standard	1.0	0.5	0.25	0.093

SAP Worksheet #15-6: Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1)

Matrix: Concrete

Analytical Group: PCBs

Analyte	CAS No.	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
					Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Aroclor-1016	12674-11-2	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0042	0.0011
Aroclor-1221	11104-28-2	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.017	0.0097
Aroclor-1232	11141-16-5	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.0033

Analyte	CAS No.	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
					Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Aroclor-1242	53469-21-9	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.0023
Aroclor-1248	12672-29-6	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.0038
Aroclor-1254	11097-69-1	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0042	0.0018
Aroclor-1260	11096-82-5	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.0057
Aroclor-1262	37324-23-5	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.008

Analyte	CAS No.	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit (PQL) Goal (mg/kg)	Laboratory Specific Limits		
					Limit of Quantitation (LOQ)	Limit of Detection (LOD)	Detection Limit (DL)
Aroclor-1268	11100-14-4	1 Total PCBs	§761.61(a) – Bulk Remediation Waste (High Occupancy Areas)	0.05	0.017	0.0083	0.008

SAP Worksheet #17: Sampling Design and Rationale

(UFP-QAPP Manual Section 3.1.1)

This section describes the sampling rationale and sampling design for the collection of surface soil samples, subsurface soil samples, concrete dust samples and paint chip samples at multiple locations at the NAS JRB Willow Grove. This wide variety of data is being collected to address data gaps identified during the CERFA evaluations and assist in completing that process. PALs have been selected based on potentially relevant regulatory cleanup levels, screening values, guidance values, and comparative criteria. The areas being investigated are anticipated to be redeveloped for mixed residential and commercial uses. Redevelopment plans have not been finalized.

Further details regarding the specific DQOs and PALs for the planned investigation are presented in Worksheet #11, and quantified in Worksheet #15. The sampling methodology and procedures are provided within the SOPs provided within this SAP in Worksheet #21. The general methodology and rationale for the specific sampling approach at each area is as follows:

- **Buildings 63, 109, 110, 111, 112, 113, and 114 - Potential Lead Release to Soil near Quarters –** Prior assessments have indicated that lead-based paint is present on the exterior of the buildings. Surface soil (0 to 6 inches bgs) will be investigated around the building perimeters to determine if it has been impacted by lead-based paint. Initial characterization will focus on the shallow soil within a narrow swath (3-feet) around the perimeter of the buildings and be biased towards areas were peeling paint is present. If lead is found to exceed the PAL listed in Worksheet #15, a limited excavation will be proposed with follow-up post excavation sampling to verify the effectiveness of the remedy. The number and location of the confirmatory soil samples will be determined based on the size and the location of the excavations. At a minimum, it is expected that one confirmatory soil sample will be collected from each excavation sidewall and bottom.

- **Former Water Tower adjacent to Building 107/108 - Lead Confirmation Sampling -** Prior investigations have confirmed lead releases to surface soil at the Former Water Tower adjacent to Building 107/108. Data from this investigation will serve to verify the effectiveness of planned "hot-spot" soil removal. The number and location of the confirmatory soil samples will be determined based on the size and the location of the excavations. At a minimum, it is expected that one confirmatory soil sample will be collected from each excavation sidewall and bottom.

- **Building 15A - Boiler Blowndown Confirmation Sampling PAH Sampling -** Prior investigations have confirmed the release of PAHs to surface soil at Building 15A. Data from this investigation will serve to verify the effectiveness of planned "hot-spot" soil removal. The number and location of the confirmatory soil samples will be determined based on the size and the location of the excavations. At a minimum, it is expected that one confirmatory soil sample will be collected from each excavation sidewall and bottom. The results of the confirmatory samples will be screened against the PAL listed in Worksheet #15 to determine if any further action is necessary.

- **Buildings 15B, 70, and 610 - Potential PCB Releases –** Transformers that are present in these buildings may have contained PCBs. Concrete dust sampling will be conducted to determine if PCBs have leaked from the transformers onto adjacent concrete surfaces. The sampling will be focus on stained surfaces immediately adjacent to the transformers.

- **Suspected Release from Oil Water Separator and Wash Rack adjacent to Building 178** – An inspection conducted during the CERFA process indicated that an OWS and wash rack was present and may have resulted in a release. Subsurface soil samples will be collected from a grassy area adjacent to the wash rack and OWS to determine if a release occurred from theses systems. Subsurface soil samples will be collected using a direct-push technology drill rig and analyzed for VOCs, SVOCs, and metals. Sample collection will be biased towards the intervals with obvious staining or elevated PID readings. In the absence of evidence of contamination, a sample will be collected from the bottom of the boring.

- **Building 139 – North Lighting Vault** – There is no documentation as to whether this building was assessed for lead-based paint. Given the age of the structure, lead based paint may be present. Paint chip sample will be collected will be collected to represent different surfaces in the building. The paint chip samples will be collected by scraping down to the bare surface materials to assess multiple layers of paint, if present.

- **"Outside Land South - South of Maple Avenue" -** Historical aerial photos show potential debris piles and areas of disturbed soil around the interior of this parcel. Based on available background information it could not be determined whether the use involved hazardous substances and/or petroleum products. Surface soil samples will be collected to determine whether a release occurred. Given the lack of available information, the samples will be analyzed for VOCs, SVOCs, and metals. The sampling will be biased toward the areas that appeared to be disturbed in the aerial photos.

- **"CERFA 2013: Additional Parcel South - South of Maple Avenue"** – A concrete pad is present on this parcel and a review of background information and aerial photos did not yield any indications of its former use. To confirm whether hazardous substances and/or petroleum products were used or stored on the pad and may have resulted in a release to soil, surface soil samples will be collected around the perimeter of the pad. The samples will be collected within 5-feet of the pad and biased toward areas of obvious staining. Given the lack of available information, the samples will be analyzed for VOCs, SVOCs, and metals.

SAP Worksheet #18, 19, 20 and 30: Field Project Implementation (Field Project Instructions)

(UFP-QAPP Manual Section 3.1.1)

Sample Details

CTO28 NAS JRG Willow Grove **Estimated Sampling Date: Fall 2013** **Building 63A** **Shealy Environmental Services, Inc. (SESI)** **Mike McFadden** **919-363-7044**						**Analysis Group**	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory / Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type / Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation / Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth / Sampling Interval**				
				X	**Y**					
63A	Soil	63A-S-01	63A-S-01-MMDDYY			0-6 inches	**X**			
63A	Soil	63A-S-02	63A-S-02-MMDDYY			0-6 inches	**X**			
63A	Soil	63A-S-03	63A-S-03-MMDDYY			0-6 inches	**X**			
63A	Soil	63A-S-04	63A-S-04-MMDDYY			0-6 inches	**X**			
63A	Soil	63A-S-05	63A-S-05-MMDDYY			0-6 inches	**X**			
Field QC Samples										
	Field Duplicate	63A-S-01	63A-S-01D-MMDDYY			0-6 inches	**X**			
	Matrix Spike	63A-S-01	Same as parent sample			0-6 inches	**X**			
	Matrix Spike Duplicate	63A-S-01	Same as parent sample			0-6 inches	**X**			
	Equipment Blank	NA	63A-EB-01			NA	**X**			
	Trip Blank	NA	NA			NA				
	Field Blank	NA	NA			NA				
						Total Number of Samples to the Laboratory	**9**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 109

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
109	Soil	109-S-01	109-S-01-MMDDYY			0-6 inches	**X**			
109	Soil	109-S-02	109-S-02-MMDDYY			0-6 inches	**X**			
109	Soil	109-S-03	109-S-03-MMDDYY			0-6 inches	**X**			
109	Soil	109-S-04	109-S-04-MMDDYY			0-6 inches	**X**			
109	Soil	109-S-05	109-S-05-MMDDYY			0-6 inches	**X**			
Field QC Samples										
	Field Duplicate	NA	NA							
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**5**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 110

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**Lead**
Preparation and Analytical Method	3050B Preparation /6010C Analysis
Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	2 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	6 months

Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
110	Soil	110-S-01	110-S-01-MMDDYY			0-6 inches	**X**			
110	Soil	110-S-02	110-S-02-MMDDYY			0-6 inches	**X**			
110	Soil	110-S-03	110-S-03-MMDDYY			0-6 inches	**X**			
110	Soil	110-S-04	110-S-04-MMDDYY			0-6 inches	**X**			
110	Soil	110-S-05	110-S-05-MMDDYY			0-6 inches	**X**			
Field QC Samples										
	Field Duplicate	110-S-01	110-S-01D-MMDDYY			0-6 inches	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 111

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**Lead**
Preparation and Analytical Method	3050B Preparation /6010C Analysis
Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	2 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	6 months

Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
111	Soil	111-S-01	111-S-01-MMDDYY			0-6 inches	**X**			
111	Soil	111-S-02	111-S-02-MMDDYY			0-6 inches	**X**			
111	Soil	111-S-03	111-S-03-MMDDYY			0-6 inches	**X**			
111	Soil	111-S-04	111-S-04-MMDDYY			0-6 inches	**X**			
111	Soil	111-S-05	111-S-05-MMDDYY			0-6 inches	**X**			
Field QC Samples										
	Field Duplicate	NA	NA							
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**5**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 112

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**Lead**
Preparation and Analytical Method	3050B Preparation /6010C Analysis
Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	2 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	6 months

Site	Matrix	Station ID	Sample ID	Coordinates (optional) X	Coordinates (optional) Y	Depth/ Sampling Interval	
112	Soil	112-S-01	112-S-01-MMDDYY			0-6 inches	**X**
112	Soil	112-S-02	112-S-02-MMDDYY			0-6 inches	**X**
112	Soil	112-S-03	112-S-03-MMDDYY			0-6 inches	**X**
112	Soil	112-S-04	112-S-04-MMDDYY			0-6 inches	**X**
112	Soil	112-S-05	112-S-05-MMDDYY			0-6 inches	**X**
Field QC Samples							
	Field Duplicate	112-S-01	112-S-01D-MMDDYY			0-6 inches	**X**
	Matrix Spike	112-S-01	Same as parent sample			0-6 inches	**X**
	Matrix Spike Duplicate	112-S-01	Same as parent sample			0-6 inches	**X**
	Equipment Blank	NA	NA				
	Trip Blank	NA	NA				
	Field Blank	NA	NA				
						Total Number of Samples to the Laboratory	**8**

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 113

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**Lead**
Preparation and Analytical Method	3050B Preparation /6010C Analysis
Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	2 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	6 months

Site	Matrix	Station ID	Sample ID	Coordinates (optional) X	Coordinates (optional) Y	Depth/ Sampling Interval	
113	Soil	113-S-01	113-S-01-MMDDYY			0-6 inches	**X**
113	Soil	113-S-02	113-S-02-MMDDYY			0-6 inches	**X**
113	Soil	113-S-03	113-S-03-MMDDYY			0-6 inches	**X**
113	Soil	113-S-04	113-S-04-MMDDYY			0-6 inches	**X**
113	Soil	113-S-05	113-S-05-MMDDYY			0-6 inches	**X**
Field QC Samples							
	Field Duplicate	NA	NA				
	Matrix Spike	NA	NA				
	Matrix Spike Duplicate	NA	NA				
	Equipment Blank	NA	NA				
	Trip Blank	NA	NA				
	Field Blank	NA	NA				
						Total Number of Samples to the Laboratory	**5**

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 114

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**Lead**
Preparation and Analytical Method	3050B Preparation /6010C Analysis
Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	2 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	6 months

Site	Matrix	Station ID	Sample ID	Coordinates (optional) X	Coordinates (optional) Y	Depth/ Sampling Interval	
114	Soil	114-S-01	114-S-01-MMDDYY			0-6 inches	**X**
114	Soil	114-S-02	114-S-02-MMDDYY			0-6 inches	**X**
114	Soil	114-S-03	114-S-03-MMDDYY			0-6 inches	**X**
114	Soil	114-S-04	114-S-04-MMDDYY			0-6 inches	**X**
114	Soil	114-S-05	114-S-05-MMDDYY			0-6 inches	**X**
Field QC Samples							
	Field Duplicate	114-S-01	114-S-01D-MMDDYY			0-6 inches	**X**
	Matrix Spike	NA	NA				
	Matrix Spike Duplicate	NA	NA				
	Equipment Blank	NA	NA				
	Trip Blank	NA	NA				
	Field Blank	NA	NA				
						Total Number of Samples to the Laboratory	**6**

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
"Outside Land South – South of Maple Avenue"

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**VOCs**	**SVOCs**	**Metals**	
Preparation and Analytical Method	5035 Preparation/ 8260B Analysis	3550C Preparation/ 8270D Analysis	3050B Preparation (excl. Hg)/6010C Analysis, 7471B Analysis	
Analytical Laboratory/ Analytical SOP Reference	SESI/S-VO-002	SESI/S-SV-021	SESI/S-IM-022, S-IM-006	
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	
Container Type/ Volume required (if different than container volume)	3x40mL glass	4 oz glass	2 oz glass	
Preservative	2x40mL with 5mL of DI water and stir bar, 1x40mL with methanol	None	None	
Holding Time (Preparation/ Analysis)	Freeze within 48 hrs, analysis within 14 days	14 days to extraction, 40 days from extraction to analysis	28 days for mercury, 6 months other metals	

Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
SOM	Soil	SOM-S-01	SOM-S-01-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-02	SOM-S-02-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-03	SOM-S-03-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-04	SOM-S-04-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-05	SOM-S-05-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-06	SOM-S-06-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-07	SOM-S-07-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-08	SOM-S-08-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-09	SOM-S-09-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	SOM-S-10	SOM-S-10-MMDDYY			0-6 inches	**X**	**X**	**X**	
Field QC Samples										
	Field Duplicate	SOM-S-01	SOM-S-01D-MMDDYY			0-6 inches	**X**	**X**	**X**	
	Matrix Spike	SOM-S-01	Same as parent sample			0-6 inches	**X**	**X**	**X**	
	Matrix Spike Duplicate	SOM-S-01	Same as parent sample			0-6 inches	**X**	**X**	**X**	
	Equipment	NA	SOM-EB-01-MMDDYY			NA	**X**	**X**	**X**	

	Blank									
	Trip Blank	NA	TB-01-MMDDYY			NA	**X**			
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**15**	**14**	**14**	

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
"CERFA 2013: Additional Parcel South – South of Maple Avenue"

Shealy Environmental Services, Inc.
Mike McFadden
919-363-7044

Analysis Group	**VOCs**	**SVOCs**	**Metals**	
Preparation and Analytical Method	5035 Preparation/ 8260B Analysis	3550C Preparation/ 8270D Analysis	3050B Preparation (excl. Hg)/6010C Analysis, 7471B Analysis	
Analytical Laboratory/ Analytical SOP Reference	SESI/S-VO-002	SESI/S-SV-021	SESI/S-IM-022, S-IM-006	
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	
Container Type/ Volume required (if different than container volume)	3x40mL glass	4 oz glass	2 oz Glass	
Preservative	2x40mL with 5mL of DI water and stir bar, 1x40mL with methanol	None	None	
Holding Time (Preparation/ Analysis)[1]	Freeze within 48 hrs, analysis within 14 days	14 days to extraction, 40 days from extraction to analysis	28 days for mercury, 6 months other metals	

Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
SOM	Soil	APSSOM-S-01	APSSOM-S-01-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	APSSOM-S-02	APSSOM-S-02-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	APSSOM-S-03	APSSOM-S-03-MMDDYY			0-6 inches	**X**	**X**	**X**	
SOM	Soil	APSSOM-S-04	APSSOM-S-04-MMDDYY			0-6 inches	**X**	**X**	**X**	
Field QC Samples										
	Field Duplicate	APSSOM-S-01	APSSOM-S-01D-MMDDYY			0-6 inches	**X**	**X**	**X**	
	Matrix Spike	APSSOM-S-01	Same as parent sample			0-6 inches	**X**	**X**	**X**	
	Matrix Spike Duplicate	APSSOM-S-01	Same as parent sample			0-6 inches	**X**	**X**	**X**	
	Equipment Blank	NA	APSOM-EB-01-MMDDYY			NA	**X**	**X**	**X**	

	Trip Blank	NA	TB-01-MMDDYY			NA	**X**			
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**9**	**8**	**8**	

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
OWS/Wash Rack

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**VOCs**	**SVOCs**	**Metals**	
Preparation and Analytical Method	5035 Preparation/ 8260B Analysis	3550C Preparation/ 8270D Analysis	3050B Preparation (excl. Hg)/ 6020A Analysis, 7471B Analysis	
Analytical Laboratory/ Analytical SOP Reference	SESI/S-VO-002	SESI/S-SV-021	SESI/S-IM-022, S-IM-006	
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	21 calendar days (verbal results in 10 calendar days)	
Container Type/ Volume required (if different than container volume)	3x40mL glass	4 oz glass	2 oz Glass	
Preservative	2x40mL with 5mL of DI water and stir bar, 1x40mL with methanol	None	None	
Holding Time (Preparation/ Analysis)	Freeze within 48 hrs, analysis within 14 days	14 days to extraction, 40 days from extraction to analysis	28 days for mercury, 6 months other metals	

Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
OWS	Soil	OWS-S-01	OWS-S-01-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-02	OWS-S-02-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-03	OWS-S-03-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-04	OWS-S-04-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-05	OWS-S-05-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-06	OWS-S-06-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-07	OWS-S-07-MMDDYY			To be determined	**X**	**X**	**X**	
OWS	Soil	OWS-S-08	OWS-S-08-MMDDYY			To be determined	**X**	**X**	**X**	
Field QC Samples										
	Field Duplicate	OWS-S-01	OWS-S-01D-MMDDYY			To be determined	**X**	**X**	**X**	
	Matrix Spike	OWS-S-01	Same as parent sample			To be determined	**X**	**X**	**X**	
	Matrix Spike Duplicate	OWS-S-01	Same as parent sample			To be determined	**X**	**X**	**X**	
	Equipment Blank	NA	OEB-01-MMDDYY			NA	**X**	**X**	**X**	

	Trip Blank	NA	TB-01-MMDDYY			NA	**X**			
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**13**	**12**	**12**	

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 15B

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**PCBs**			
						Preparation and Analytical Method	3550C Preparation /8082A Analytical			
						Analytical Laboratory/ Analytical SOP Reference	SESI/S-SV-003			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	4 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	14 days to extraction, 40 days from extraction to analysis			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
15B	Concrete	15B-C-01	15B-C-01-MMDDYY			0-2 cm	**X**			
15B	Concrete	15B-C-02	15B-C-02-MMDDYY			0-2 cm	**X**			
15B	Concrete	15B-C-03	15B-C-03-MMDDYY			0-2 cm	**X**			
Field QC Samples										
	Field Duplicate	15B-C-01	15B-C-01D-MMDDYY			0-2 cm	**X**			
	Matrix Spike	15B-C-01	Same as parent sample			0-2 cm	**X**			
	Matrix Spike Duplicate	15B-C-01	Same as parent sample			0-2 cm	**X**			
	Equipment Blank	NA	15B-EB-01-MMDDYY			NA	**X**			
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**7**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 70

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

Analysis Group	**PCBs**
Preparation and Analytical Method	3550C Preparation /8082A Analytical
Analytical Laboratory/ Analytical SOP Reference	SESI/S-SV-003
Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)
Container Type/ Volume required (if different than container volume)	4 oz glass
Preservative	None
Holding Time (Preparation/ Analysis)	14 days to extraction, 40 days from extraction to analysis

Site	Matrix	Station ID	Sample ID	Coordinates (optional) X	Coordinates (optional) Y	Depth/ Sampling Interval	
70	Concrete	70-C-01	70-C-01-MMDDYY			0-2 cm	**X**
70	Concrete	70-C-02	70-C-02-MMDDYY			0-2 cm	**X**
70	Concrete	70-C-03	70-C-03-MMDDYY			0-2 cm	**X**
Field QC Samples							
	Field Duplicate	NA	NA				
	Matrix Spike	NA	NA				
	Matrix Spike Duplicate	NA	NA				
	Equipment Blank	NA	NA				
	Trip Blank	NA	NA				
	Field Blank	NA	NA				
						Total Number of Samples to the Laboratory	**3**

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 610

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**PCBs**			
						Preparation and Analytical Method	3550C Preparation /8082A Analytical			
						Analytical Laboratory/ Analytical SOP Reference	SESI/S-SV-003			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	4 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	14 days to extraction, 40 days from extraction to analysis			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
610	Concrete	610-C-01	610-C-01-MMDDYY			0-2 cm	**X**			
610	Concrete	610-C-02	610-C-02-MMDDYY			0-2 cm	**X**			
610	Concrete	610-C-03	610-C-03-MMDDYY			0-2 cm	**X**			
Field QC Samples										
	Field Duplicate	NA	NA							
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**3**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: Fall 2013
Building 139

Shealy Environmental Services, Inc.
Mike McFadden
919-363-7044

						Analysis Group	**Lead Based Paint**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
139	Paint Chips	139-PC-01	139-PC-01-MMDDYY			NA	**X**			
139	Paint Chips	139-PC-02	139-PC-02-MMDDYY			NA	**X**			
139	Paint Chips	139-PC-03	139-PC-03-MMDDYY			NA	**X**			
Field QC Samples										
	Field Duplicate	NA	NA							
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	139-EB-01-MMDDYY			NA	**X**			
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**4**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 15A - Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**PAHs**			
						Preparation and Analytical Method	3550C Preparation/ 8270D Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/S-SV-021			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	4 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	14 days to extraction, 40 days from extraction to analysis			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
15A	Soil	15A-CS-01	15A-CS-01-MMDDYY			To be determined	**X**			
15A	Soil	15A-CS-02	15A-CS-02-MMDDYY			To be determined	**X**			
15A	Soil	15A-CS-03	15A-CS-03-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	15A-CS-01	15A-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	15A-CS-01	Same as parent sample			To be determined	**X**			
	Matrix Spike Duplicate	15A-CS-01	Same as parent sample			To be determined	**X**			
	Equipment Blank	NA	15A-EB-01-MMDDYY			To be determined	**X**			
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**7**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Buildings 107/108 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
107/108	Soil	107/108-CS-01	107/108-CS-01-MMDDYY			To be determined	**X**			
107/108	Soil	107/108-CS-02	107/108-CS-02-MMDDYY			To be determined	**X**			
107/108	Soil	107/108-CS-03	107/108-CS-03-MMDDYY			To be determined	**X**			
107/108	Soil	107/108-CS-04	107/108-CS-04-MMDDYY			To be determined	**X**			
107/108	Soil	107/108-CS-05	107/108-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	107/108-CS-01	107/108-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 63A – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
63A	Soil	63A-CS-01	63A-CS-01-MMDDYY			To be determined	**X**			
63A	Soil	63A-CS-02	63A-CS-02-MMDDYY			To be determined	**X**			
63A	Soil	63A-CS-03	63A-CS-03-MMDDYY			To be determined	**X**			
63A	Soil	63A-CS-04	63A-CS-04-MMDDYY			To be determined	**X**			
63A	Soil	63A-CS-05	63A-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	63A-CS-01	63A-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 109 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
109	Soil	109-CS-01	109-CS-01-MMDDYY			To be determined	**X**			
109	Soil	109-CS-02	109-CS-02-MMDDYY			To be determined	**X**			
109	Soil	109-CS-03	109-CS-03-MMDDYY			To be determined	**X**			
109	Soil	109-CS-04	109-CS-04-MMDDYY			To be determined	**X**			
109	Soil	109-CS-05	109-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	109-CS-01	109-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 110 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
110	Soil	110-CS-01	110-CS-01-MMDDYY			To be determined	**X**			
110	Soil	110-CS-02	110-CS-02-MMDDYY			To be determined	**X**			
110	Soil	110-CS-03	110-CS-03-MMDDYY			To be determined	**X**			
110	Soil	110-CS-04	110-CS-04-MMDDYY			To be determined	**X**			
110	Soil	110-CS-05	110-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	110-CS-01	110-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 111 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory / Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type / Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation / Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth / Sampling Interval**				
				X	**Y**					
111	Soil	111-CS-01	111-CS-01-MMDDYY			To be determined	**X**			
111	Soil	111-CS-02	111-CS-02-MMDDYY			To be determined	**X**			
111	Soil	111-CS-03	111-CS-03-MMDDYY			To be determined	**X**			
111	Soil	111-CS-04	111-CS-04-MMDDYY			To be determined	**X**			
111	Soil	111-CS-05	111-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	111-CS-01	111-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 112 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
112	Soil	112-CS-01	112-CS-01-MMDDYY			To be determined	**X**			
112	Soil	112-CS-02	112-CS-02-MMDDYY			To be determined	**X**			
112	Soil	112-CS-03	112-CS-03-MMDDYY			To be determined	**X**			
112	Soil	112-CS-04	112-CS-04-MMDDYY			To be determined	**X**			
112	Soil	112-CS-05	112-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	112-CS-01	112-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 113 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
113	Soil	113-CS-01	113-CS-01-MMDDYY			To be determined	**X**			
113	Soil	113-CS-02	113-CS-02-MMDDYY			To be determined	**X**			
113	Soil	113-CS-03	113-CS-03-MMDDYY			To be determined	**X**			
113	Soil	113-CS-04	113-CS-04-MMDDYY			To be determined	**X**			
113	Soil	113-CS-05	113-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	113-CS-01	113-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

Sample Details

CTO28 NAS JRG Willow Grove
Estimated Sampling Date: TBD, If Necessary
Building 114 – Confirmation Soil Samples, Exact Number TBD

Shealy Environmental Services, Inc. (SESI)
Mike McFadden
919-363-7044

						Analysis Group	**Lead**			
						Preparation and Analytical Method	3050B Preparation /6010C Analysis			
						Analytical Laboratory/ Analytical SOP Reference	SESI/SOP # S-IM-022			
						Data Package Turnaround Time	21 calendar days (verbal results in 10 calendar days)			
						Container Type/ Volume required (if different than container volume)	2 oz glass			
						Preservative	None			
						Holding Time (Preparation/ Analysis)	6 months			
Site	**Matrix**	**Station ID**	**Sample ID**	**Coordinates** (optional)		**Depth/ Sampling Interval**				
				X	**Y**					
114	Soil	114-CS-01	114-CS-01-MMDDYY			To be determined	**X**			
114	Soil	114-CS-02	114-CS-02-MMDDYY			To be determined	**X**			
114	Soil	114-CS-03	114-CS-03-MMDDYY			To be determined	**X**			
114	Soil	114-CS-04	114-CS-04-MMDDYY			To be determined	**X**			
114	Soil	114-CS-05	114-CS-05-MMDDYY			To be determined	**X**			
Field QC Samples										
	Field Duplicate	114-CS-01	114-CS-01D-MMDDYY			To be determined	**X**			
	Matrix Spike	NA	NA							
	Matrix Spike Duplicate	NA	NA							
	Equipment Blank	NA	NA							
	Trip Blank	NA	NA							
	Field Blank	NA	NA							
						Total Number of Samples to the Laboratory	**6**			

SAP Worksheet #21: Project Sampling SOP References Table

(UFP-QAPP Manual Section 3.1.2)

Reference Number	Title, Revision Date and / or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
3-01	3-01 Utility Clearance Revision 0 June 2012	Resolution Consultants	Remote subsurface sensing, magnetometer, GPR, etc.	No	
3-02	3-02 Logbooks Revision 0 May 2012	Resolution Consultants	Not Applicable	No	
3-03	3-03 Recordkeeping, Sample Labeling, and Chain-of-Custody Revision 0 May 2012	Resolution Consultants	Not Applicable	No	
3-04	3-04 Sample Handling, Storage, and Shipping Revision 0 May 2012	Resolution Consultants	Not Applicable	No	
3-05	3-05 IDW Management Revision 0 May 2012	Resolution Consultants	Not Applicable	No	
3-06	3-06 Equipment Decontamination Revision 0 May 2012	Resolution Consultants	Not Applicable	No	
3-15	3-15 Monitoring Well Abandonment Revision 0 June 2012	Resolution Consultants	Not Applicable	No	
3-16	3-16 Soil and Rock Classification Revision 0 August 2012	Resolution Consultants	Not Applicable	No	
3-17	3-17 Direct Push Sampling Techniques Revision 0 May 2012	Resolution Consultants	Geoprobe®	No	
3-20	3-20 Operation and Calibration of a PID Revision 0 May 2012	Resolution Consultants	Photoionization Detector (PID)	No	
3-21	3-21 Surface and Subsurface Soil Sampling Procedures Revision 0 May 2012	Resolution Consultants	Hand Auger	No	

SAP Worksheet #23-1: Analytical SOP References Table

(UFP-QAPP Manual Section 3.2.1)

Laboratory Name and Address: Shealy Environmental Services, Inc., 106 Vantage Point Drive, West Columbia, SC 29172

Lab SOP Number	Title, Revision Date, and Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to QSM	Modified for Project Work? (Y/N)
S-VO-002	GC/MS Volatiles Analysis based on Methods 8260B AND 624 rev 16	Definitive	Soil / VOCs	GC/MS	No Variance	N
S-SV-021	GC/MS 8270D analysis Prep Method 3520C 3550C, 3580A, and 3580A Rev10	Definitive	Soil / SVOCs and PAHs, including SIM	GC/MS	No Variance	N
S-EX-003	Continuous Liq-Liq Extraction Method 3520C rev 12 03/26/13	Definitive	Soil, concrete / SVOCs, PCBs, and PAHs	Not applicable (extraction)	No Variance	N
S-EX-017	Ultrasonic Extraction Method 3550B/C rev 5 04/11/13	Definitive	Soil, concrete / SVOCs, PCBs, and PAHs	Not applicable (extraction)	No Variance	N
S-EX-021	Semivolatile Cleanup Procedures Rev 5 08/22/13	Definitive	Soil, concrete / SVOCs, PCBs, and PAHs	Not applicable (extraction)	No Variance	N
S-SV-003	GC Analysis based on EPA 608 and SW-846, Methods 8000B, 8081A/B, 8082/A, rev 15 06/12/13	Definitive	Concrete / PCBs	GC/ECD	No Variance	N
S-IM-013	Acid Digestion of Sediments, Sludges and Soils, Method 3050B, Rev 8 04/10/13	Definitive	Soil / TAL Metals	Not applicable (digestion)	No Variance	N
S-IM-022	ICP-AES BY 6010C, rev3	Definitive	Soil / TAL Metals Paint chips/ Lead	Inductively Coupled Plasma (ICP) – Atomic Emission Spectroscopy (AES)	No Variance	N
S-IM-006	Mercury by Cold Vapor AA Method 245.1/7470A and Method 245.2/7471A/B, REV11, 04/10/13	Definitive	Soil / Mercury	Hydra AA Analyzer	No Variance	N
S-IM-011	Digestion of Solid and Semisolid Wastes for Hg Analysis S-IM-011 Rev 9 04/10/13	Definitive	Soil / Mercury	Not applicable (digestion)	No Variance	N

SAP Worksheet #28-1: Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix: Soil

Analytical Group: Polycyclic Aromatic Hydrocarbons (Full Scan and/or Selected Ion Monitoring), Semivolatile Organic Compounds

Analytical Method/ SOP Reference: 8270D/ S-SV-021

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per batch of 20 or less.	No analytes detected > ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results	Correct problem, then see criteria in Box D-1. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	Analyst, Laboratory Supervisor and Data Validator	Bias / Contamination	No analytes detected > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > LOQ (see Box D-1 in DoD QSM).
Performance Check	At the beginning of each 12-hour period, prior to analysis of samples.	Degradation ≤ 20% for DDT. Benzidine and pentachlorophenol should be present at their normal responses, and should not exceed a tailing factor of 2.	Correct problem then repeat breakdown checks.	Analyst, Laboratory Supervisor	Accuracy / Bias	Degradation ≤ 20% for DDT. Benzidine and pentachlorophenol should be present at their normal responses, and should not exceed a tailing factor of 2.
System Monitoring Compounds (SMC)/Surrogates	6 per sample. Recommended: 2-Fluorophenol Phenol-d6 2,4,6-Tribromophenol Nitrobenzene-d5 2-Fluorobiphenyl ortho-Terphenyl	DOD QSM limits for %R.	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	DOD QSM limits for %R.

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Laboratory Control Sample (LCS)	One per batch of 20 or less.	QC acceptance criteria specified by DoD, if available.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	DOD QSM limits for %R.
Internal Standards (IS)	6 per sample. Recommended: 1,4-Dichlorobenzene-d4 Naphthalene-d8 Acenaphthene-d10 Phenanthrene-d10 Chrysene-d12 Perylene-d12	Retention time +/- 30 seconds from RT of the ICAL midpoint standard, and the EICP area within -50% to +100 % of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Laboratory Supervisor and Data Validator.	Accuracy / Bias	Retention time +/- 30 seconds from RT of the ICAL midpoint standard, and the EICP area within -50% to +100 % of ICAL midpoint standard.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One per SDG or every 20 samples.	For matrix evaluation, use LCS acceptance criteria specified by DoD, if available.	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. Check for errors in calculations and spike preparation. Check un-spiked sample results and surrogate recoveries for possible matrix effects. If no errors are found and the associated LCS in control, matrix effects are the likely cause. Qualify failing analytes as estimated.	Analyst, Laboratory Supervisor and Data Validator.	Precision / Accuracy / Bias	DOD QSM limits for %R. MS/MSD RPD should be ≤ 30%.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ	NA	Analyst, Supervisor	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-2 Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix: Soil, Paint Chips

Analytical Group: ICP-AES Metals

Analytical Method/ SOP Reference: 6010C/ S-IM-022

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No target metals> ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value must be < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
LCS	One per digestion batch of 20 or fewer samples of similar matrix (varies by lot).	%R must be within DoD QSM limits, allowing for the marginal exceedances presented in DoD QSM Table G-1.	Re-digest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/ Contamination	Same as Method/SOP QC Acceptance Limits.
Matrix Spike	One per digestion batch or SDG or every 20 samples.	%R should be within the DoD QSM limits for LCS, if sample < 4x spike added.	Flag results for affected analytes for all associated samples with "N."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits for LCS.
Post-digestion Spike	When dilution test fails or analyte concentration in all samples < 50x LOD	%R should be within 75-125%.	Run associated samples by method of standard addition or flag results.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Laboratory Duplicate	One per digestion batch or SDG or every 20 samples.	Project-specific criteria: If values are ≥ 5x LOQ, RPD should be ≤ 20%. If values are < 5x LOQ, Absolute Difference should be ≤ LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	Same as Method/SOP QC Acceptance Limits.
ICP Serial Dilution	One per preparation batch of 20 or fewer samples of similar matrix.	If original sample result is at least 50x LOQ, 5-fold dilution must agree within ± 10% of the original result.	Flag results for affected analytes for all associated samples with "E."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Certified Reference Material (paint chip analysis only)	One per preparation batch of 20 or fewer samples.	%R must be within manufacturer's acceptance limits.	Re-digest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-3 Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix: Soil

Analytical Group: Mercury (CVAA)

Analytical Method/ SOP Reference: 7471B/ S-IM-006

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No mercury > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
LCS	One per digestion batch of 20 or fewer samples of similar matrix.	Water and Sediment: %R must be within 80-120%.	Re-digest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/ Contamination	Same as Method/SOP QC Acceptance Limits.
MS	One per digestion batch or SDG or every 20 samples.	%R should be within 80-120% if sample < 4x spike added.	Flag results for affected analytes for all associated samples with "N."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits for LCS.
Laboratory Duplicate	One per digestion batch or SDG or every 20 samples.	Project-specific criteria: If values are ≥ 5x LOQ, RPD should be ≤ 20%. If values are < 5x LOQ, Absolute Difference should be ≤ LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	RPD < 20%

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ	NA	Analyst, Supervisor	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-4 Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix: Soil

Analytical Group: Volatile Organic Compounds

Analytical Method/ SOP Reference: 8260B/ S-VO-002

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager, and Data Validator	Bias/Contamination	Same as Method/SOP QC Acceptance Limits.

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Surrogate	Four per sample: Dibromofluoromethane 1,2-Dichloroethane-d4 Toluene-d8 4-Bromofluorobenzene	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits.	For QC and field samples, correct problem then re-prepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. Contact Client if samples cannot be reanalyzed within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits. otherwise, within laboratory's statistically-derived QC limits (Refer to Worksheet #28-1a). Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be reanalyzed within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
MS/MSD	One per Sample Delivery Group or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be ≤ 30%.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix; otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Internal Standard	Four per sample: Pentafluorobenzene Chlorobenzene-d5 1,4-dichlorobenzene-d4 1,4-Difluorobenzene	Retention times for internal standards must be ± 30 seconds and the responses within -50% to +100% of the ICAL midpoint standard.	Inspect mass spectrometer or gas chromatograph for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	Not applicable	Apply "J" qualifier to results between DL and LOQ.	Not applicable	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-5 Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix: Concrete

Analytical Group: Polychlorinated Biphenyls (Aroclors)

Analytical Method/ SOP Reference: 8082A/ S-SV-003

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of 20 or fewer samples of similar matrix.	No target compounds > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager and Data Validator	Bias/ contamination	Same as Method/SOP QC Acceptance Limits
Surrogates	Two per sample: Decachloro-biphenyl Tetrachloro-m-xylene.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived or nominal QC limits.	For QC and field samples, correct problem then re-prepare and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
LCS	One per preparation batch of 20 or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits. Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
MS/MSD	One per SDG or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be ≤ 30%.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix, otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/ Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Second Column Confirmation	All positive results must be confirmed.	Results between primary and second column must be RPD ≤ 40%.	None. Apply qualifier if RPD >40% and discuss in the case narrative. The higher of the two results will be reported unless matrix interference is apparent.	Analyst, Laboratory Department Manager, and Data Validator	Precision	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #34-36: Data Verification and Validation (Steps I and IIa/IIb) Process Table

(UFP-QAPP Manual Section 5.2.1), (UFP-QAPP Manual Section 5.2.2), (Figure 37 UFP-QAPP Manual), (Table 9 UFP-QAPP Manual)

Data Review Input	Description	Responsible for Verification (name, organization)	Step I / IIa / IIb [1]	Internal/ External
Chain-of-Custody Forms	The Resolution Field Team Leader or designee will review and sign each chain-of-custody form to verify that all samples listed are included in the shipment to the laboratory and the sample information is accurate. The chain-of-custody forms will be signed by the sampler and a copy will be retained for the project file, the Resolution Project Manager, and the Subcontract Data Validator.	Field Team Leader and Field Crew, Resolution	I	External
Chain-of-Custody Forms	The Laboratory Sample Custodian will review the sample shipment for completeness and integrity and will sign accepting the shipment.	Laboratory Sample Custodian	I	Internal
Chain-of-Custody Forms	The data validator will check that the chain-of-custody form was signed and dated by the Resolution Field Team Leader or designee relinquishing the samples and also by the Laboratory Sample Custodian receiving the samples for analyses. The data validator will confirm that the custody and integrity of the samples were maintained from collection to analysis and that custody records are complete and any deviations are recorded.	Data Validator, Resolution	I	External
Field SOPs/Field Logs/Sample Collection	Confirm that all sampling SOPs were followed. Verify that deviations have been documented and performance criteria have been achieved, that samples were correctly identified, that sampling location coordinates are accurate, and that documentation establishes an unbroken chain of custody from sample collection to report generation. Verify that the correct sampling and analytical procedures were applied. Verify that the SAP was followed as written and that any deviations are documented.	Project Manager, Field Team Leader, or designee, Resolution	IIa	External

Data Review Input	Description	Responsible for Verification (name, organization)	Step I / IIa / IIb [1]	Internal/ External
Field Screening Data (Field Analyses)	Field screening results will be reviewed for completeness and to confirm that analyses were performed in accordance with the applicable SOPs. Data will be reviewed to determine whether calibration and quality control requirements specified in the applicable SOPs were met. Results for which these criteria were not met will be noted in the report when the results are presented.	Project Manager, Field Team Leader, or designee, Resolution	IIa	External
Sample Tables	Proposed samples verified to have been collected.	Field Team Leader and Field Crew, Resolution	IIa	External
Sample Log Sheets	Log sheets completed as samples are collected in the field are verified for completeness and are maintained at the project office.	Project Manager, Field Team Leader, or designee, Resolution	IIa	External
Field QC Samples	Verify that field QC samples listed in Worksheet #12 were collected as required.	Field Team Leader or designee, Resolution	IIa	External
Sample Coordinates	Sample locations will be validated to be correct and in accordance with the SAP (compare map of proposed locations to map of actual locations).	Project Manager, Field Team Leader, or designee, Resolution	IIa	External
Analytical SOPs	Confirm that all laboratory SOPs were followed. Verify that the correct analytical methods/SOPs were applied.	Laboratory Quality Assurance Manager	IIa	Internal
Documentation of Method QC Results	Establish that all method QC samples were analyzed and in control as listed in the analytical SOPs. If method QA is not in control, the Laboratory Quality Assurance Manager will contact Resolution for guidance prior to report preparation.	Laboratory Quality Assurance Manager	IIa	Internal
Analytical Data Packages	All analytical data packages will be verified internally for completeness by the laboratory performing the work. The Laboratory Quality Assurance Manager will sign the case narrative for each data package.	Laboratory Quality Assurance Manager	IIa	Internal
Analytical Data Packages	Verify that the data package contains all the elements required by the laboratory Master Services Agreement and laboratory work order. Missing information will be requested from the laboratory, and data validation (if applicable) will be suspended until missing data are received.	Data Validator, Resolution	IIa	External

Data Review Input	Description	Responsible for Verification (name, organization)	Step I / IIa / IIb [1]	Internal/ External
Documentation of Analytical Reports for Completeness	Confirm that the required analytical samples have been collected, appropriate sample identifications have been used, and correct analytical methods have been applied. Data Validator will verify that elements of the data package required for validation are present, and if not, the laboratory will be contacted and the missing information will be requested. Validation will be performed as described below per Worksheet #36. Verify all data have been transferred correctly and completely to the final project database.	Data Validator, Resolution	IIa	External
Electronic Data Deliverables	The electronic data will be compared to the chain-of-custody form and hard copy data package to verify accuracy and completeness.	Data Validator, Resolution	IIa	External
Analytical Data Packages	Limited data validation will be performed using criteria for the method listed in Worksheet #'s 12, 15, and 28, the DoD QSM v 4.2 laboratory work order, and laboratory SOPs. If not addressed in the worksheets or DoD QSM, the logic outlined in the *USEPA National Functional Guidelines for Superfund Organic Methods Data Review* (June 2008), and *USEPA National Functional Guidelines for Inorganic Methods Data Review* (January 2010) will be used to apply qualifiers to data.	Data Validator, Resolution	IIb	External
Analytical Data Packages (in addition to Level II Validation)	Data Results: Verify that the summary form results are consistent with those presented on the EDD. Project Quantitation Limits for Sensitivity: Verify that the LOQs and LODs listed in Worksheet # 15 were achieved.	Data Validator, Resolution	IIa/IIb	External
Data Validation Report	Summarize deviations from methods, procedures, or contracts. Qualify data results based on method or QC deviation and explain all data qualifications. Print a copy of the project database, qualified data depicting data qualifiers, and data qualifiers codes that summarize the reason for data qualifications. Determine if the data met the MPCs and determine the impact of any deviations on the technical usability of the data.	Data Validator, Resolution	IIa/IIb	External

Data Review Input	Description	Responsible for Verification (name, organization)	Step I / IIa / IIb [1]	Internal/ External
Project Action Limits	Discuss the impact of matrix interferences or sample dilutions performed, because of the high concentration of one or more contaminants, on the other target compounds reported as not detected. Document this usability issue and inform the Resolution Project Manager.	Resolution Project Chemist	IIa/IIb	External
SAP QC Sample Documentation	Verify that all QC samples specified in the SAP were collected and analyzed and that the associated results were within prescribed SAP acceptance limits. Verify that QC samples and standards prescribed in analytical SOPs were analyzed and within the prescribed control limits. If any significant QC deviations occur, the Laboratory Quality Assurance Manager shall have contacted the Resolution Project Chemist or Project Manager.	Data Validator, Resolution	IIa/IIb	External
Analytical Data Deviations	Determine the impact of any deviation from sampling or analytical methods, SOP requirements, and matrix interferences on the analytical results.	Data Validator, Resolution	IIa/IIb	External

Notes:
1 IIa=compliance with methods, procedures, and contracts [see Table 10, page 117, UFP-QAPP manual, V.1, March 2005.]
IIb=comparison with measurement performance criteria in the SAP [see Table 11, page 118, UFP-QAPP manual, V.1, March 2005]

References

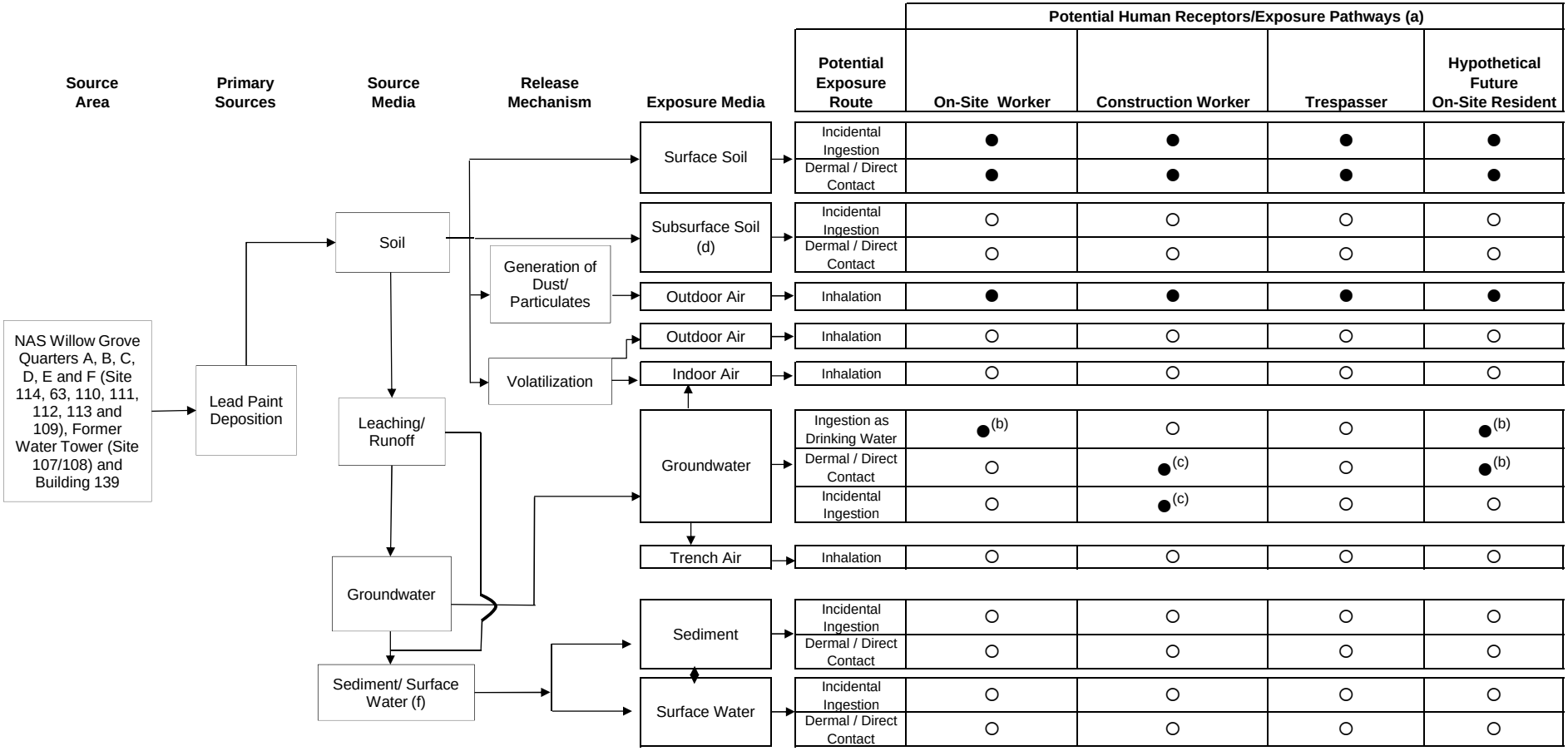
Air Force Center for Environmental Excellence (AFCEE), 1997. *Long Term Monitoring Optimization Guide, Version 1.1.* Major Daniel L. Welch Project Point-of-Contact.

Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic, 2007. CERFA Identification of Uncontaminated Property at the Naval Air Station Joint Reserve Base, Willow Grove, Pennsylvania. April 2007.

Tetra Tech NUS, 2011. Remedial Investigation Report For Site 3 Night Street Landfill Volume 1 Of 2 Text NASJRB Willow Grove PA. October 2011.

Figures

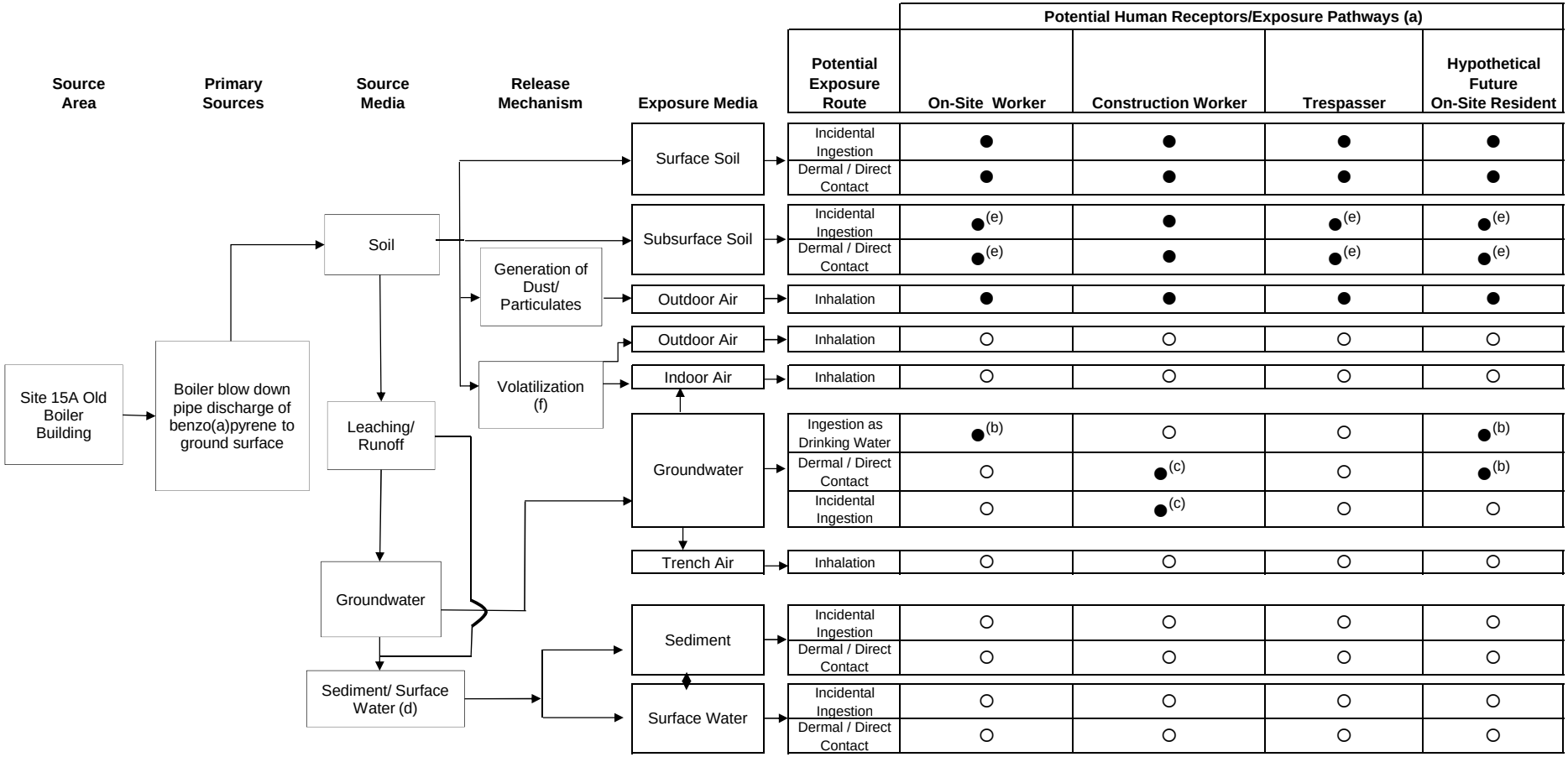
Figure 10-1
Conceptual Site Model
Sites 114, 63, 110, 111, 112, 113 and 109
NAS JRB Willow Grove, PA



Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) Groundwater is not currently used for potable use. However, there are no restrictions on groundwater, therefore groundwater direct contact exposure scenarios are proposed for evaluation of future use.
(c) The associated pathway is potentially complete if the water table is equal to or less than 15 feet below ground surface, making it available for contact by a construction worker.
(d) Subsurface soil is not considered to contain lead paint based on deposition from primary source.
(e) Lead is not sufficiently volatile, therefore, the volatilization pathways is assumed to be incomplete.
(f) There are no nearby water bodies. Sediment and surface water pathways are assumed to be incomplete.

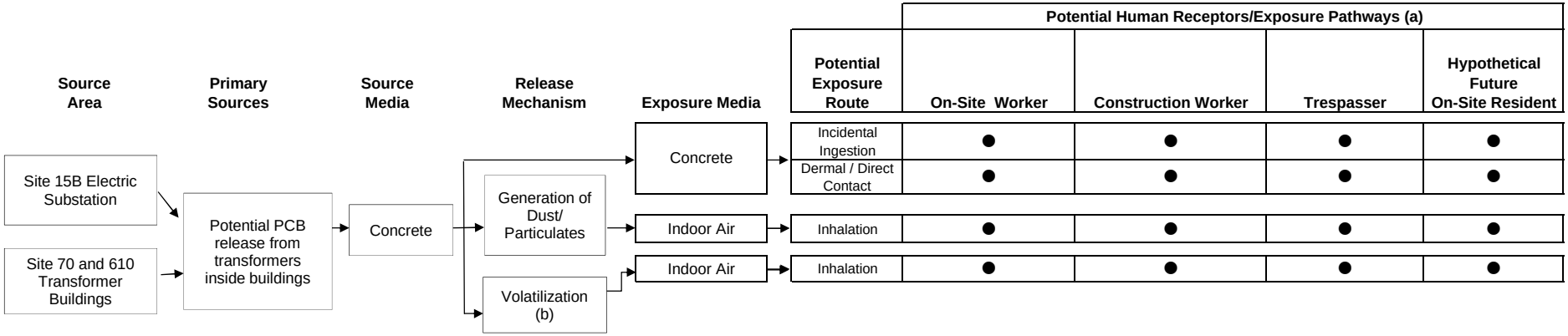
Figure 10-2
Conceptual Site Model
Site 15A
NAS JRB Willow Grove, PA



Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) Groundwater is not currently used for potable use. However, there are no restrictions on groundwater, therefore groundwater direct contact exposure scenarios are proposed for evaluation of future use.
(c) The associated pathway is potentially complete if the water table is equal to or less than 15 feet below ground surface, making it available for contact by a construction worker.
(d) There are no nearby water bodies. Sediment and surface water pathways are assumed to be incomplete.
(e) Exposure to subsurface soil is a potentially complete pathway under a future use scenario if deeper soils are brought to the surface during potential future re-development of the site.
(f) Benzo(a)pyrene is not sufficiently volatile, therefore, the volatilization pathways is assumed to be incomplete.

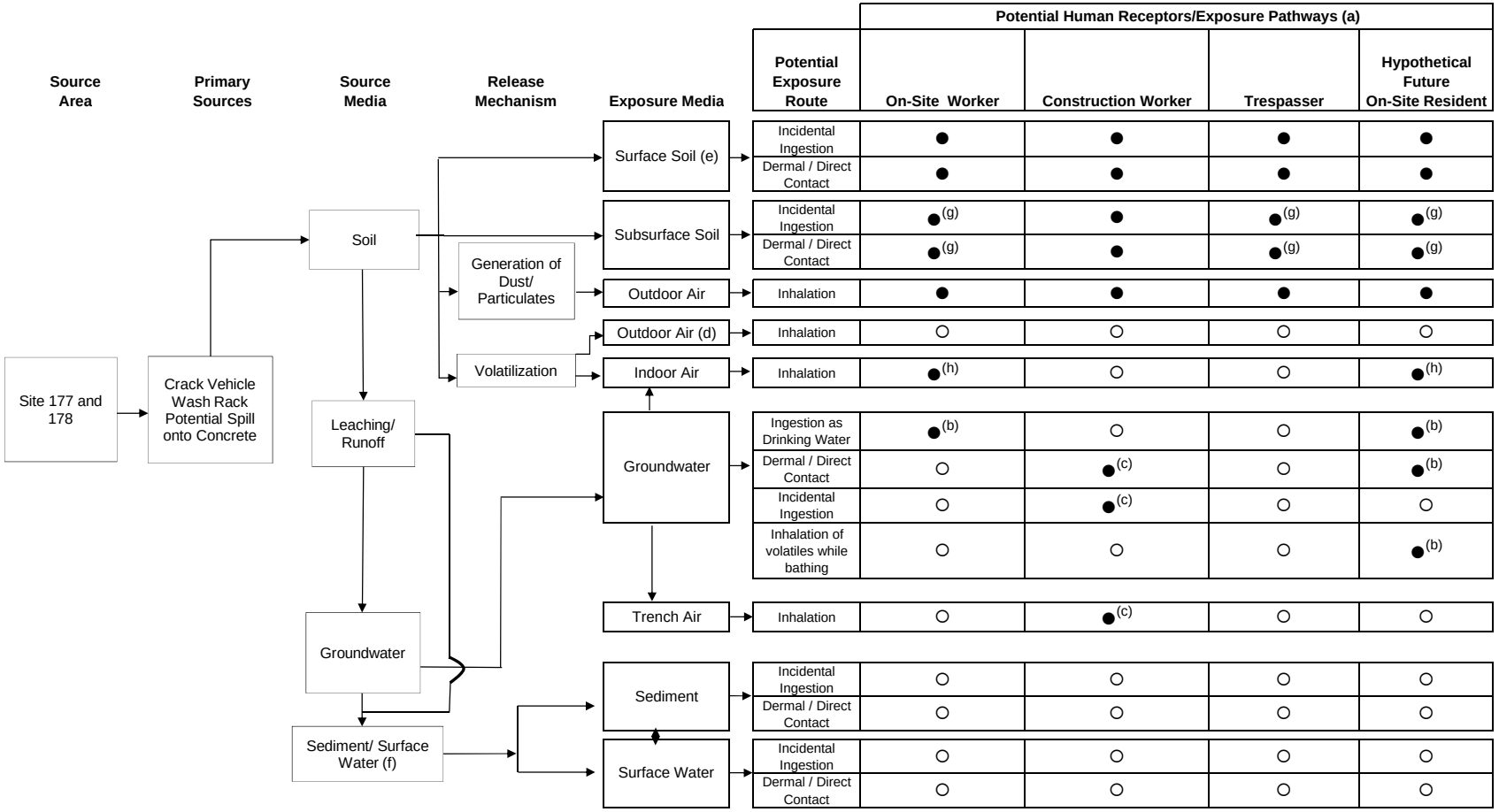
Figure 10-3
Conceptual Site Model
Site 15B, 70 and 610
NAS JRB Willow Grove, PA



Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) The volatilization pathway is potentially complete for the following aroclors:Aroclor 1221 and 1232. Other Aroclors are not sufficiently volatile.

Figure 10-4
Conceptual Site Model
Sites 177 and 178
NAS JRB Willow Grove, PA

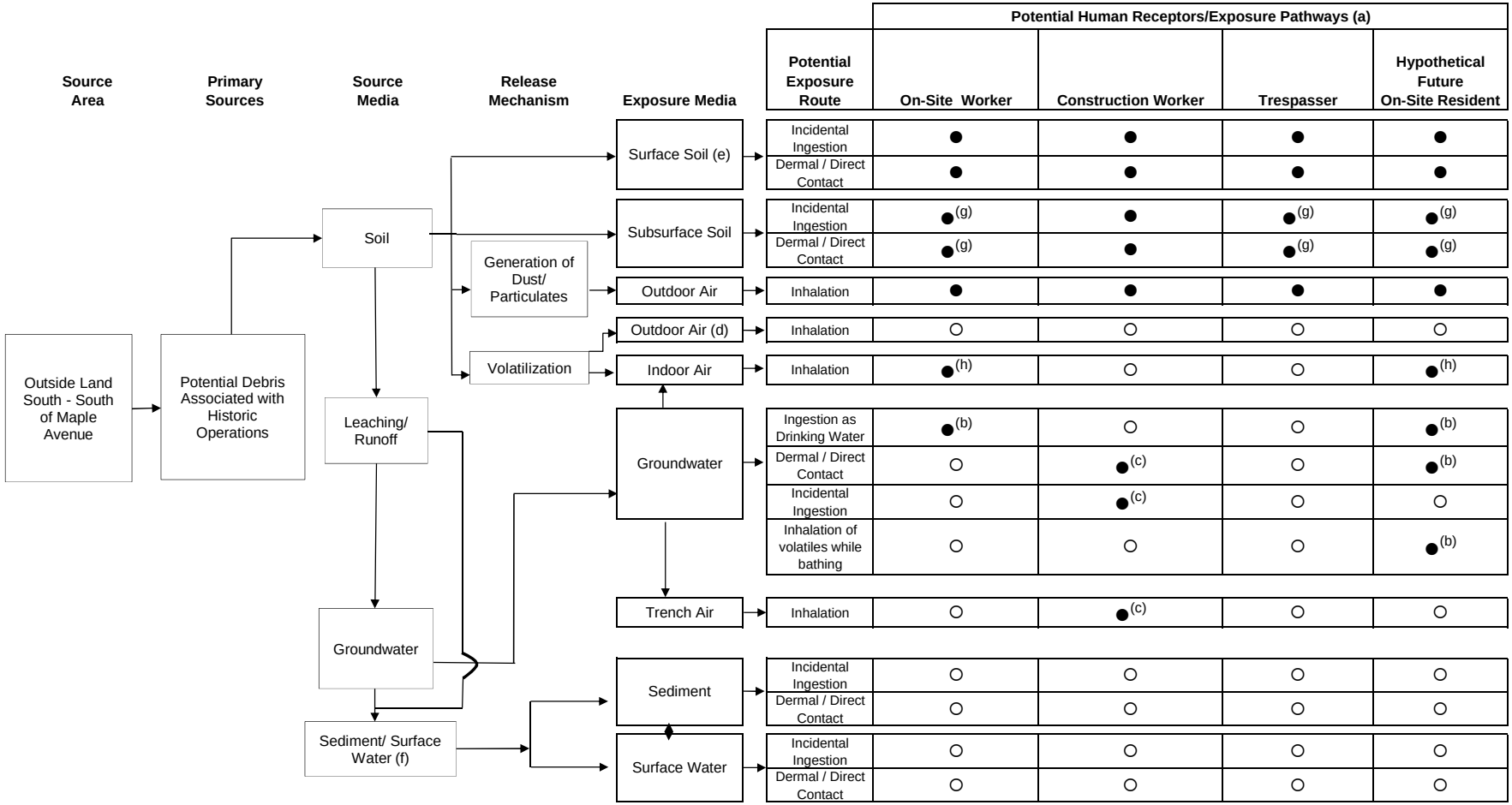


Exposure Media	Potential Exposure Route	On-Site Worker	Construction Worker	Trespasser	Hypothetical Future On-Site Resident
Surface Soil (e)	Incidental Ingestion	●	●	●	●
	Dermal / Direct Contact	●	●	●	●
Subsurface Soil	Incidental Ingestion	●(g)	●	●(g)	●(g)
	Dermal / Direct Contact	●(g)	●	●(g)	●(g)
Outdoor Air	Inhalation	●	●	●	●
Outdoor Air (d)	Inhalation	○	○	○	○
Indoor Air	Inhalation	●(h)	○	○	●(h)
Groundwater	Ingestion as Drinking Water	●(b)	○	○	●(b)
	Dermal / Direct Contact	○	●(c)	○	●(b)
	Incidental Ingestion	○	●(c)	○	○
	Inhalation of volatiles while bathing	○	○	○	●(b)
Trench Air	Inhalation	○	●(c)	○	○
Sediment	Incidental Ingestion	○	○	○	○
	Dermal / Direct Contact	○	○	○	○
Surface Water	Incidental Ingestion	○	○	○	○
	Dermal / Direct Contact	○	○	○	○

Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) Groundwater is not currently used for potable use. However, there are no restrictions on groundwater, therefore groundwater direct contact exposure scenarios are proposed for evaluation of future use.
(c) The associated pathway is potentially complete if the water table is equal to or less than 15 feet below ground surface, making it available for contact by a construction worker.
(d) Volatilization of compounds from soil to outdoor air is considered an insignificant pathway.
(e) Applies to the layer of soil directly beneath concrete.
(f) There are no nearby water bodies. Sediment and surface water pathways are assumed to be incomplete.
(g) Exposure to subsurface soil is a potentially complete pathway under a future use scenario if deeper soils are brought to the surface during potential future re-development of the site.
(h) Assumes presence of occupied buildings on-site (currently or in the future).

Figure 10-5
Conceptual Site Model
Outside Land South - South of Maple Avenue
NAS JRB Willow Grove, PA

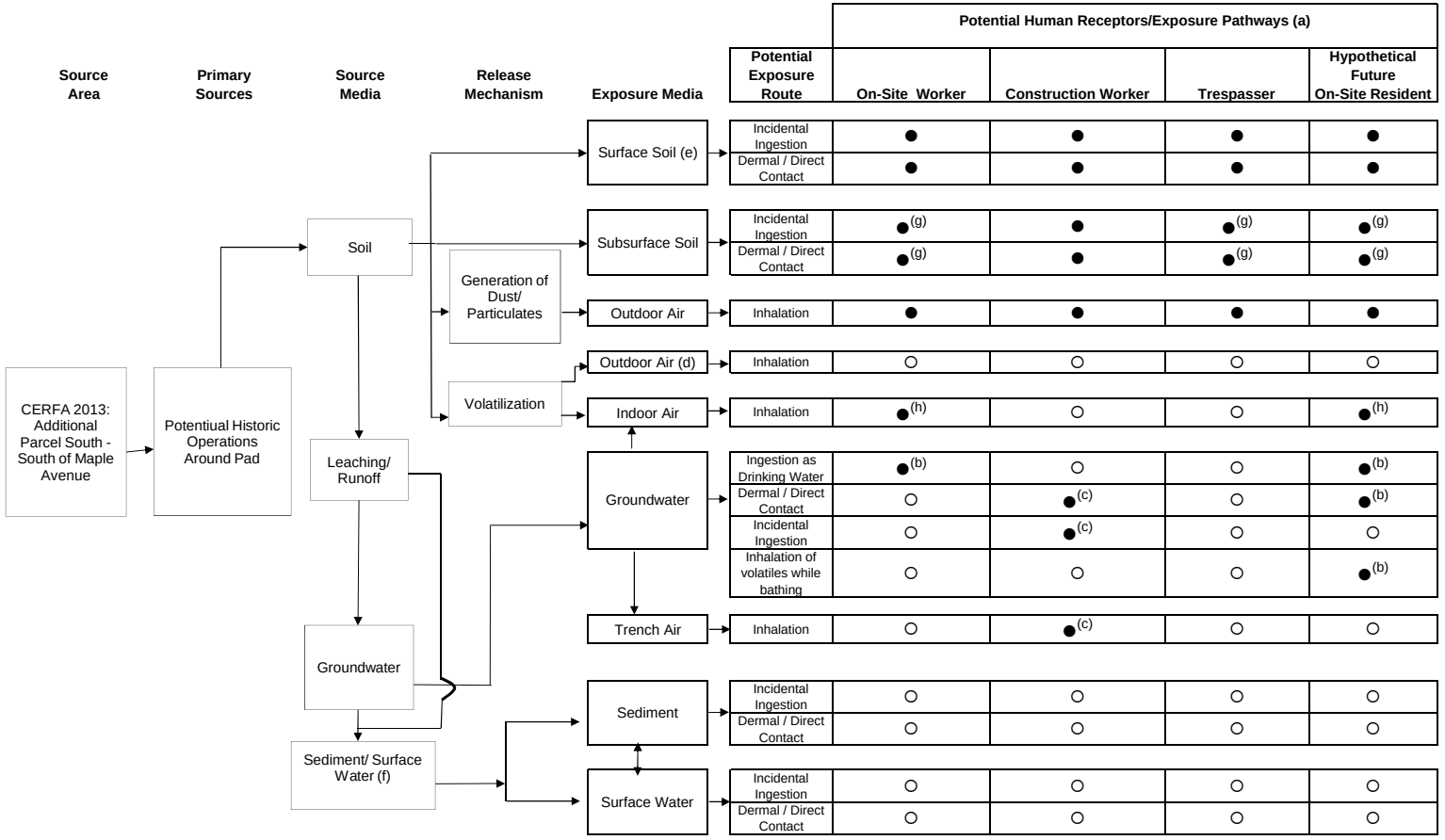


Exposure Media	Potential Exposure Route	Potential Human Receptors/Exposure Pathways (a)			
		On-Site Worker	Construction Worker	Trespasser	Hypothetical Future On-Site Resident
Surface Soil (e)	Incidental Ingestion	●	●	●	●
	Dermal / Direct Contact	●	●	●	●
Subsurface Soil	Incidental Ingestion	●(g)	●	●(g)	●(g)
	Dermal / Direct Contact	●(g)	●	●(g)	●(g)
Outdoor Air	Inhalation	●	●	●	●
Outdoor Air (d)	Inhalation	○	○	○	○
Indoor Air	Inhalation	●(h)	○	○	●(h)
Groundwater	Ingestion as Drinking Water	●(b)	○	○	●(b)
	Dermal / Direct Contact	○	●(c)	○	●(b)
	Incidental Ingestion	○	●(c)	○	○
	Inhalation of volatiles while bathing	○	○	○	●(b)
Trench Air	Inhalation	○	●(c)	○	○
Sediment	Incidental Ingestion	○	○	○	○
	Dermal / Direct Contact	○	○	○	○
Surface Water	Incidental Ingestion	○	○	○	○
	Dermal / Direct Contact	○	○	○	○

Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) Groundwater is not currently used for potable use. However, there are no restrictions on groundwater, therefore groundwater direct contact exposure scenarios are proposed for evaluation of future use.
(c) The associated pathway is potentially complete if the water table is equal to or less than 15 feet below ground surface, making it available for contact by a construction worker.
(d) Volatilization of compounds from soil to outdoor air is considered an insignificant pathway.
(e) Also applies to soil directly beneath concrete.
(f) There are no nearby water bodies. Sediment and surface water pathways are assumed to be incomplete.
(g) Exposure to subsurface soil is a potentially complete pathway under a future use scenario if deeper soils are brought to the surface during potential future re-development of the site.
(h) Assumes presence of occupied buildings on-site (currently or in the future).

Figure 10-6
Conceptual Site Model
CERFA 2013: Additional Parcel South - South of Maple Avenue
NAS JRB Willow Grove, PA



Notes:
● Potentially complete pathway.
○ Pathway considered to be incomplete or insignificant.

(a) Based on current and/or potential future site use.
(b) Groundwater is not currently used for potable use. However, there are no restrictions on groundwater, therefore groundwater direct contact exposure scenarios are proposed for evaluation of future use.
(c) The associated pathway is potentially complete if the water table is equal to or less than 15 feet below ground surface, making it available for contact by a construction worker.
(d) Volatilization of compounds from soil to outdoor air is considered an insignificant pathway.
(e) Also applies to soil directly beneath concrete.
(f) There are no nearby water bodies. Sediment and surface water pathways are assumed to be incomplete.
(g) Exposure to subsurface soil is a potentially complete pathway under a future use scenario if deeper soils are brought to the surface during potential future re-development of the site.
(h) Assumes presence of occupied buildings on-site (currently or in the future).

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\WillowGrove\GIS\112G00845\0410\CERFA\Maps\Willow_Grove_CERFA_Figure_11_1.mxd

Buildings 109, 110, 111, 112, & 113
(Quarters F, B, C, D, & E)
- 1 Surface Soil Samples per 25 Feet of Dripline: Lead Analysis
- If Necessary, Approximately 5 Confirmatory Soil Samples per Excavation: Lead Analysis.

Buildings 107/108 (Former Water Tower)
- Approximately 5 Confirmatory Soil Samples: Lead Analysis

Building 70 (Transformer Building)
- Approximately 3 Concrete Samples: PCB Analysis

Building 15B (Electric Substation)
- 3 Concrete Samples: PCB Analysis

Building 15A (Old Boiler Building)
- Approximately 3 Confirmatory Soil Samples: PAH Analysis

CERFA 2013: OUTSIDE LAND EAST OF EASTON ROAD

OUTSIDE LAND SOUTH-EAST OF EASTON RD.

CONCRETE PAD

CERFA 2013: Additional Parcel South - South of Maple Avenue
- 4 Surface Soil Samples around Pad: VOC, SVOC, & Metals Analysis

Outside Land South - South of Maple Avenue
- 10 Surface Soil Samples: VOC, SVOC, & Metals Analysis

Buildings 63 & 114
(Quarters A & Barn)
- 5 Surface Soil Samples per Site: Lead Analysis
- If Necessary, 5 Confirmatory Samples: Lead Analysis

Building 178 (OWS/Wash Rack)
- 8 Subsurface Soil Samples: VOC, SVOC, & Metals Analysis

Building 610 (Transformer Building)
- 3 Concrete Samples: PCB Analysis

Building 139 (North Lighting Vault)
- 3 Paint Samples: Lead

DISPLAY HELICOPTER
MUSEUM
JOGGING TRACK
BALLFIELD
PARKING P
80S/80N CONTROL TOWER
FUEL FARM
HORSHAM AIR GUARD STATION
AIRFIELD
PARCEL A
PARCEL B
PARCEL C
PARCEL D
NORTH END LANDFILL
PARCEL E
PARCEL F
20+ OLD FLIGHTLINE
LAND AROUND 114
A/B
FIELD
AIRFIELD COMPASS ROSE/Site 5
AIRFIELD FIRE TRAINING AREA/Site 6
9TH ST. LF
NINTH STREET LANDFILL
WEATHER STATION AND SURROUNDING LAND
CERFA 2013: OUTSIDE LAND NORTH
CERFA 2013: OUTSIDE LAND NORTHWEST
ABANDONED RIFLE RANGE 2
ROUTE 611 (EASTON RD.)
MAPLE AVENUE
COUNTY LINE ROAD
KEITH VALLEY RD.
ROUTE 463 (HORSHAM RD.)
NORRISTOWN RD.
HALLOWELL AVE.
TOUCHDOWN POINT
NATURE TRAIL
GOLF COURSE
INDUSTRIAL
RESIDENTIAL (CULTIVATED)
TACAN HARDSTAND
WEATHER STATION
MARINE PAD
NORTH 36 RED 36 MIN 10 SEC WEST RUNWAY 8036 FT X 200 FT
E-28 ARRESTING GEAR
APPROACH LIGHTING
ELEV. 297.85
ELEV. 300.60
SSA 11
SSA 12
Site 1 AND PRIVATE RD. COMPLEX
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 9
Site 10

0 2,100 4,200 Feet

SITE LOCATION

Legend

1 Installation Restoration Site No.

Category 1/White-Areas of no known release and/or disposal

Category 2/Red-Areas of known release and/or disposal

Category 3/Yellow-Areas of potential release and/or disposal

NASJRB 08/31/2005 RJG

RESOLUTION CONSULTANTS

FOLLOW UP CERFA INVESTIGATION AREAS NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE, PA

FILE	SCALE
Willow_Grove_CERFA_Figure_11_1.mxd	AS NOTED
FIGURE NUMBER: FIGURE 11-1	REV: 3 DATE: 10/31/13

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\WillowGrove\GIS\112G00845\0410\CERFA\Maps\Willow_Grove_CERFA_WashRack_Figure_11_2.mxd

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RESOLUTION CONSULTANTS

OUTSIDE LAND SOUTH - SOUTH OF MAPLE AVENUE INVESTIGATION AREA NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE, PA

FILE	SCALE
Willow_Grove_CERFA_SouthParcel.mxd	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 11-3	1 / 10/31/13

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\WillowGrove\GIS\112G00845\0410\CERFA\Maps\Willow_Grove_CERFA_SouthParcel_Figure_11_4.mxd

Concrete Pad

CERFA 2013: Additional Parcel South - South of Maple Avenue

SITE LOCATION

0 40 80
Feet

Legend

Surface Soil Sample

RESOLUTION CONSULTANTS

CERFA 2013: ADDITIONAL PARCEL SOUTH - SOUTH OF MAPLE AVENUE
INVESTIGATION AREA
NAVAL AIR STATION
JOINT RESERVE BASE
WILLOW GROVE, PA

FILE	SCALE
Willow_Grove_CERFA_SouthParcel.mxd	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 11-4	1 / 10/31/13